A window open on the world

The UNESCO Courier

December 1965 (18th year) Price: 50 cents

ARTS
of Africa
Oceania
America
(pre-Columbian)

8 PAGES
IN COLOUR

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AMPHORA in the form of a seated figure with an air of utter dejection. Polished red terra cotta. Pacific Coast Civilization, Mexico (300-1250 A.D.). See page 33.

D. Olmedo Phillips Collection, Mexico City

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Cover photo

Detail of large African sculpture carved from a tree trunk, a work recently displayed in a remarkable exhibition of masterpieces from the collection of the Musée de l'Homme in Paris. The complete figure is shown on page 10.

THE STEP TO MAN

by John R. Platt

Can science keep on expanding indefinitely? The American biophysicist, John R. Platt, doubts it and sees our present era of change converging to a limit that may usher in the most extraordinary transformation of all—a new type of man and a world society reaching across the solar system.

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CHANGE, change, change, continual change. This is the watchword of modern life. We have not only adjusted to it, many of us have begun to revel in it. Conservative scientists have predicted the end of change at various times, but they have always been proved wrong. It seems it must go on forever. In the last two decades, the changes have been coming faster than ever before. Planes have passed the speed of sound, bombs have become incredible and then incredible squared, men are in orbit, and here below, new countries have proliferated, television has become universal, and every corner of the world is in a state of ferment.

Yet it seems to me that the excitement of our changes and emergencies has led us to look at them on too short a time scale. Let us not view them through the eyes of the newsman with this month's crisis or of the advertiser selling this year's cars or even through the eyes of the planner announcing development programmes for 15 years ahead. Let us look at our changes under the aspect of history. Grandparents are still alive who saw the coming of the motorcar and the airplane. Let us look at least as far ahead, to the time when our children will be grandparents in the 21st century; or 100 or 500 years ahead of that—to a time, say, as far away as the Renaissance is today.

I think anyone who does this will soon realize that most of the dramatic changes that have characterized the 20th century, like those in travel and communications and weapons, cannot possibly continue at the present rates for anything like these lengths of time. It becomes obvious that many of them must converge rather soon to various kinds of limits, so that these aspects of society must begin to take on much more stable forms.

Should it surprise anyone that there might be an end to structural change in society? A boy does not go on growing forever. He finally reaches manhood and stops—though his mature accomplishments are just beginning. Likewise if a world once becomes unified, by communication and travel and mutual danger, into one world, the situation must level off. What more is there to do in that direction?

Many of our important indices of technical achievement have been shooting up exponentially for many years, very much like the numbers in the biologists' colonies of bacteria, that double in every generation as each cell divides into two again. But such a curve of growth obviously cannot continue indefinitely in any field. The growth of the bacterial colony slows up as it begins to exhaust its nutrient. The exponential curve bends over and flattens out into the more general "S-curve" or "logistic curve" of growth.

Stevan Dedijer, of the University of Lund (Sweden) and Derek DeSolla Price of Yale University, in his book *Little Science, Big Science* (Columbia Univ. Press, New York, 1963), have recently emphasized that research-and-development expenditures in the United States are now slowing up their rate of growth in just this way and are already beginning to be "past the middle of the S-curve." The reason is clear. Big research-and-development depends on big money, and these expenditures are beginning to exhaust their nutrient.

But I think this phenomenon of slowing up is now becoming much more general. Many scientists seem to suppose that we are just at the beginning of a curve of indefinitely accelerating change. They point out that Laplace and then Michelson long ago predicted the end of change in physics and that they were wrong. But it is one thing to see a slowing up of intellectual returns in certain areas, and another thing to see that life is short and the world is small and that there are physical and natural and economic limits to everything.

JOHN R. PLATT, *former professor of biophysics and physics at the University of Chicago, is now associated director of the Mental Research Institute at the University of Michigan. The present article is a chapter from his forthcoming book, "The Step to Man" to be published next year by John Wiley and Sons, New York, London and Sydney. His "The Excitement of Science" appeared in 1962.*

On a huge mural composition, 17 metres long by 3 metres high (55 ft. × 6 ft. 6 in.) the distinguished Swiss artist, Hans Erni, has depicted our modern civilization based on scientific and technical progress. Its theme is the genius of man the planner and organizer and the entire process of industrial creation. Here we present the composition, which continues on pages 6, 7 and 9. Erni shows us symbolically the machinery which the brain of man has created for his needs : machines for writing and printing, computers and electronic equipment. This work in colour, which was executed for the 1964 Swiss National Exhibition in Lausanne, has been reproduced photographically on aluminium panels. It is now displayed in the Zurich Exhibition Hall.

I think it can be shown that many of our present changes are already rushing rapidly toward such limits. And many of our social adjustments to change are well on their way to what might be called "steady-state forms" that could accommodate orders of magnitude of further technical development without much additional restructuring.

I suggest that it is time to consider a different view, that we are not at the beginning of continually accelerating change, but that we are in the middle of a unique transitional crisis, like adolescence, as we make the jump from an undeveloped scientific and technological society to a fully developed one. Who knows?—we may be even beginning to be past the worst of the crisis, at least in countries like the United States. The slowing down of growth and the beginnings of our adjustment to it may become one of the major social phenomena of the next 30 years. Do you doubt this? Take a brisk excursion with me through some of our important areas of change and see if it is not so.

Consider for example what is happening at present in certain technical fields, as typified, say, by the high-energy accelerators of modern physics. DeSolla Price shows in his book that for 35 years now, we have been increasing the energies of our largest accelerators almost exponentially, as Fermi pointed out some years ago. It is worth quoting some of the numbers, although very approximate figures will suffice for the points I want to make.

In the late 1920s, atomic particles could be accelerated to roughly 500,000 electron volts of energy. Successive inventions raised the limit to about 20 million electron volts in the 1930s; to 500 million by about 1950, and to 30,000 million by the 1960s. Today, one machine under construction is designed for 50,000 million electron volts. This is an increase by a factor of 10^5 in energy in these 35 years, or a multiplication of the energy by another factor of 10 in every seven years.

Can new inventions raise the energies by still another factor of 10^5 in the next 35 years? Perhaps, but many doubt it. The reason is money. At present there is talk of a 200,000 million-electron-volt accelerator which will cost far over 100 million dollars; after that, of a billion (a million-million) electron-volt machine. But this would be so large that it might require international co-operation to finance, and the work of thousands of physicists and engineers for 10 years to construct—that is, a major fraction of all the money and effort likely to be spent on physics in the whole world in that period. There are protests from other scientists whose projects are equally in need of money.

Of course, this probable leveling-off of one expensive field does not mean that the era of change is over, even in physics. Other areas of exponential progress may appear again and again. But this example shows us what forms and limits, from now on, will shape them all. Research-and-development is now a major social business, to be planned for, to be encouraged more richly than ever, to be put to immediate use when possible—and to be consciously limited to a fraction of the national resources and the national budget that is probably not far above the 20,000 million dollars, or three percent, that is presently being spent on it the United States. There is a plateau here, an organizational steady state, that we have nearly reached already.

Let us go on to consider another rapidly changing technical field and one with more social impact, the field of computing machines. In the last 20 years or so, the 10-place desk calculator has been surpassed first by John von Neumann's ENIAC computer at the end of the war and now by much faster and more sophisticated devices. It is hard to give exact figures for the improvement in speed and capacity of the machines in this period because the principles of operation have changed drastically, but it might be estimated as a factor of roughly 10^5.

In one instance that I know of, a brilliant student in the early 1950s took two years on a desk computer to do a quantum-mechanical calculation that was done five years later on an electronic computer in 14 minutes. By now, the time required to do this calculation, once a machine has been programmed for it, is probably less than one minute.

Today the designers of solid-state and other advanced

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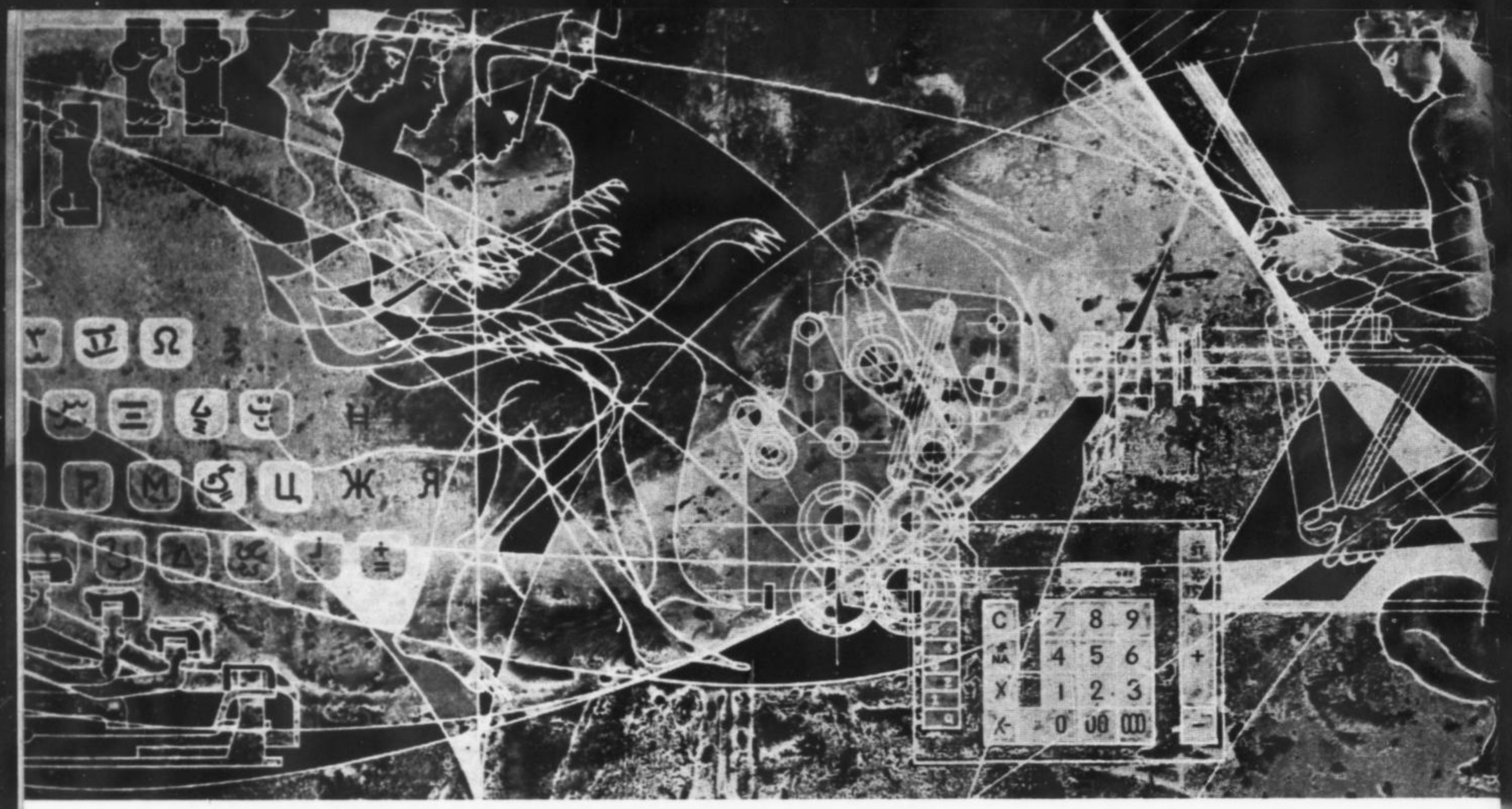


THE STEP TO MAN *(Cont'd)*

Plateaux in science and communication

computers say that a further increase in speed and capacity by a factor of 10 or 100 is in sight, but they do not seem to expect another factor of 10^5 in the next 20 years. When the information travels between the parts of a computer with the velocity of light, the natural limit to the speed of operation has been reached, and this is a limit which is no longer very far off.

It is true that we are probably on the verge of great developments in applying computers to pattern perception and learning and to complex manipulating systems. But computers are already an integral part of advanced science and business and government. Machining and accounting and management and strategy problems are increasingly being turned over to them. It is therefore a little hard to see how even a dramatic extension of their powers could make as much further difference to our attitudes and ways of life as their development up to the present level has already made.

This may possibly be true even of the application of computers to automation, which is threatening to give us leisure in the decade ahead. This is sure to produce in the long run a great social restructuring; yet it is a restructuring which is already well under way. The problems produced by the elimination of labour are not the problems of the 30 hours a week, or 10 hours, or none, that a man works. They are problems of coupling this to economic distribution and to self-respect, and problems of idleness and boredom in the 138 or 158 or 168 hours when he does not work. They are not nearly as different from the present situation as it is different from that of the last century; and the time when we will be forced to find some sort of solution to these problems is almost certainly within the next decade or two. On the scale of history, are we not almost there already?

Suppose we turn instead to the fields of communication and travel. In communication, the coming of the telephone and radio and of television, in the last 20 years—now with satellite relays across the oceans—has taken us onto a plateau that is obvious to anyone who thinks about it. Once we can transmit sight and sound around the world within two seconds whenever we want to, there is little further to be done but to extend the networks.

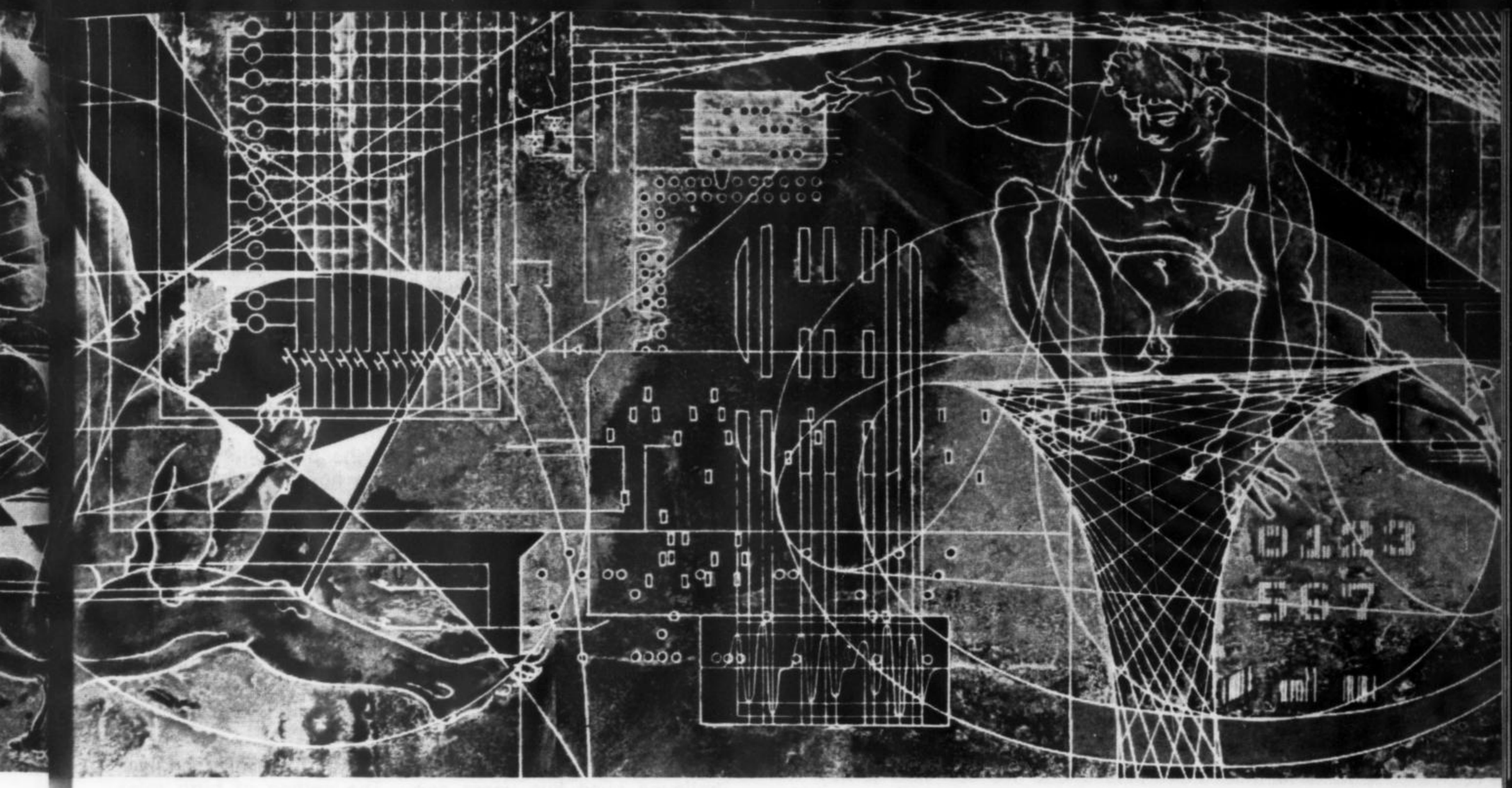
It is not generally realized, however, that we are also approaching an effective plateau in our speeds of travel. I once had the idea that we ought to organize a Centenary Celebration in honour of the occasion when man first traveled faster than the top speed of any animal or bird. This important breakthrough in evolution must have occurred about 100 years ago when the steam locomotive first got up to 60 or 70 miles an hour.

Today millions of people fly at 600 miles an hour in commercial jets. Commercial supersonic transports for 2,000 miles an hour are on the drawing boards ; and experimental rocket planes have passed 4,000 miles an hour.

How long can this acceleration of speed go on? This is an easy question to answer, because it is finished. At around 100 miles an hour, we give up land transport and take to the air. At around 17,000 miles an hour, we give up air travel because we are in orbit. And this step is already behind us.

As a matter of fact, I think the full sociological consequences of high-speed transport are already implicit in the jet-plane speeds we have today. Scarcely a hundred years ago, going around the world meant months of sailing around the Horn. Now civilians as well as armies can reach almost any point on the globe in less than a day. Can any further reduction in this time say to six hours by supersonic transport, or to one hour by rocket ever make as great a difference again? I think not. In most worldwide plans and operations, travel time is no longer the most significant variable.

Once horses had been tamed, men built their lives and societies around them for thousands of years. Today the United States is built around highspeed powered transportation. We have the automobile, the airplane, and the Go-Kart. It is transport that shapes the layout of roads and cities and airports and the structure and mobility of youth and workers and families and business and government. Might not our accommodations to fast easy trans-



portation, and our attitude of taking it for granted, go on again almost unchanged for hundreds or thousands of years?

I must confess that I fail to see how any new vehicle, no matter how marvelous, could again have the revolutionary effect that the railroad, the automobile, and the aeroplane had when they displaced the horse and carriage. Once more, regardless of future developments, in some important sense we are there already.

It is more surprising to realize that this is also almost true of space travel today, even though at the time I am writing this, it has been just seven years since the first orbiting satellite, Sputnik, was sent up. Dramatic order-of-magnitude improvements, and manned missions to the moon and planets, and wonderful decades or centuries of exploration are still ahead. But the moon has already been photographed from close range and the Mariner flights are under way, sending back detailed data from Venus and Mars. Rockets already have the speed needed for exploring the solar system, and the time required would not be appreciably reduced by new plasma or nuclear rockets. The unexpected result is that the level of accessibility of the solar system that we can develop in the next 10 or 20 years may quite possibly represent its level of accessibility for hundreds of years to come.

Or to come back to terrestrial matters, consider the exploration of our own globe. Just since 1953, men have climbed the highest mountain and reached the bottom of the deepest sea. They have lived on a floating island in the Arctic and at the South Pole all year around—with running water and hot showers. Much more remains to be done, especially in exploring the oceans and penetrating the solid crust, but it is clear that the whole surface of the earth has become ours to study and use as we wish. When there is no farther to go, there is no farther to go. We have stepped up onto that plateau as well.

What about our technical achievements having to do with life and death?

I think the same imminent leveling-off can be seen here also. As everyone knows, bombs have increased in power from the 20-ton chemical "blockbuster" of the early 1940s to the 20,000-ton atomic bomb at Hiroshima and then the 20-million-ton hydrogen weapons after 1953—an increase by six orders of magnitude within a single decade. Today the largest hydrogen bombs are equivalent to about 100 million tons of TNT, and there are so many of them—so much "overkill"—that they could wipe out all life on the planet. But the largest ones are already too large to have maximum efficiency for surface destruction, and the use of a number of smaller ones is computed to be more "effective" for military purposes. Will we make larger bombs in the future? We can if we want to, but even for the most overwhelming military purposes, we do not need to.

Even in the matter of the *control* of nuclear weapons, I think we may be approaching some sort of limit. This takes a little explanation. How dangerous can the situation get? At the present time we are near the edge of a precipice. Every year or two there is some major international crisis where there is a serious probability of an "accident" that could trigger a nuclear war and escalate into nuclear catastrophe for the world. Korea, Suez, Berlin, Quemoy, Cuba, Vietnam. Last week's crisis, whatever it was.

It is nuclear roulette, so to speak, where the probability of a fatal shot may be small each time you pull the trigger, but where, if you play the game long enough, it finally, certainly, kills you. Dedicated men have worked very hard in each of these confrontations to avoid a nuclear incident, but we may not continue to be so lucky.

As a result, some have estimated that our "half-life" under these circumstances—that is, the probable number of years before these repeated confrontations add up to a 50-50 chance of destroying the human race forever—may be only about 10 to 20 years. Obviously this is not an objectively testable number. Nevertheless the idea is clear. We see that our boasted decreases in death rates and increases in the length of individual human lives in this century are spurious, as long as this nuclear danger is so uncontrolled. This is the first time in the history of the human race that babies—all babies everywhere forever—have had such a slim chance of survival.

Then why do I say that we are near a limit in these dangers? Just because this cannot continue. No one lives very long walking on loose rocks at the edge of a precipice. Either very soon, in 10 or 20 years, or in 30 or 40, we fall over the nuclear precipice; or else very soon, before that time runs out, we argue some sense into our collective heads and move back from the danger.

Some people talk of another possibility, that we might have a nuclear war with some people still surviving—at least *this* time—by going underground, in shelters and mines. But this, even if it could work, is only a temporary and horrible postponement of the problem—like falling partway down the precipice and then getting up, battered,

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The cultural 'shock-front' of history

to fall again. Do we come out of the shelters at last, to bury and clean up and rebuild, only to have the survivors going underground again with a resurgence of nuclear powers in another 20 years or so? And then again 20 years after that? Or do we stay underground for a thousand years and hope we will mysteriously have learned how to solve the problem of our competing nuclear threats after that time?

This is obviously not an alternative at all. It is nothing but a refusal to face the necessity for agreeing eventually on a method of international nuclear control, a refusal to see that no postponement in the shelters offers anything but greater danger and difficulty.

I have gone into these alternatives here, simply to explain the basis of my conclusion that within a few years the situation will be over. Either we will be finished—or half-finished, trying to drag ourselves up again with none of the problems solved—or we will have drawn back from the precipice by actually bargaining or paying for nuclear restraints, with even the most difficult nations, so as to give us all a longer half-life.

But if in this short time ahead we can find a way to reduce these crises and probabilities by, say, a factor of 10, then we might begin to have 100 or 200 years to think how to reduce them further. And then we might begin to have a chance of lasting 2,000 years—or 20,000!—hopefully, say, as long as agriculture has lasted! I can only conclude that if we live, and if we work to live, we are even now within sight of a plateau and even a falling-off in the dimension of terror. But time is running out, and it is the wisdom and effort of men today, in this present generation, within the very next few years, that will make this permanent decision for us as to whether we live or die.

FINALLY, let us consider that other problem of life and death, the population problem.

Julian Huxley once pointed out that the two major biological inventions in historic times have been the control of germ diseases, and artificial contraceptives. They date from the work of Pasteur and of Goodyear just a hundred years ago. It is these inventions and their successors that are mainly responsible for our present population explosion —and for the hope of controlling it. They are the positive and the negative feedbacks determining human numbers.

Today bacterial diseases are approaching extinction, and virus diseases are coming under control. In the last 20 years, four of the last great killers, malaria, syphillis, tuberculosis, and polio, have been essentially wiped out, thanks to antibiotics and sulfa drugs and vaccines and DDT. Cancer and circulatory diseases remain—and let no one belittle them! But most of mankind has already acquired toward disease the Pasteurian attitude, one that we might keep for a thousand years or forever, the attitude that we can do something about disease and need not remain its helpless victims.

The trouble is that this has led to an exponential growth of population that looks overwhelming unless something is done about it. And once more we discover that this present age is the time of the transitional crisis. It is said that Palaeolithic man doubled his numbers every 30,000 years. Today the world population doubles every 30 or 40 years—roughly 1,000 times as fast.

This exponential growth is so steep that it cannot go on for very long, on the scale of history. Today our population is over 3,000 million. By the year 2000, with a 40-year doubling time, it will be 6,000 million; by 2040, 12,000 million; by 2080, 25,000 million; by 2120, 50,000 million. This is almost 20 times our present numbers—a horrible prospect —and close to the estimated limit of the earth's food supply, even at the starvation level. But if the food supply is twice or four times as great, it is only a matter of another 40 or 80 years. The problem is in the exponential character of the growth, not in any particular numbers we put in.

We see that within an uncertainly of 50 years or so, the time before the population growth slows up or levels off from starvation is only a couple of long life-times, a time no greater than the age of the United States. In fact, the famine is beginning already, with the population going up and the amount of food per capita now dropping steadily year after year in several countries.

If the world wanted to level off its population at some less extreme density before reaching universal starvation, say at a density of no more than twice our present numbers, we see that it would have to get agreements and apply effective methods of control almost immediately, for it would have to produce a leveling-off in less than 40 years. The surprising thing is that this may now be technically possible, because of the rapid development of cheaper and simpler methods of birth control, such as oral contraceptives and intrauterine coils, in the last decade.

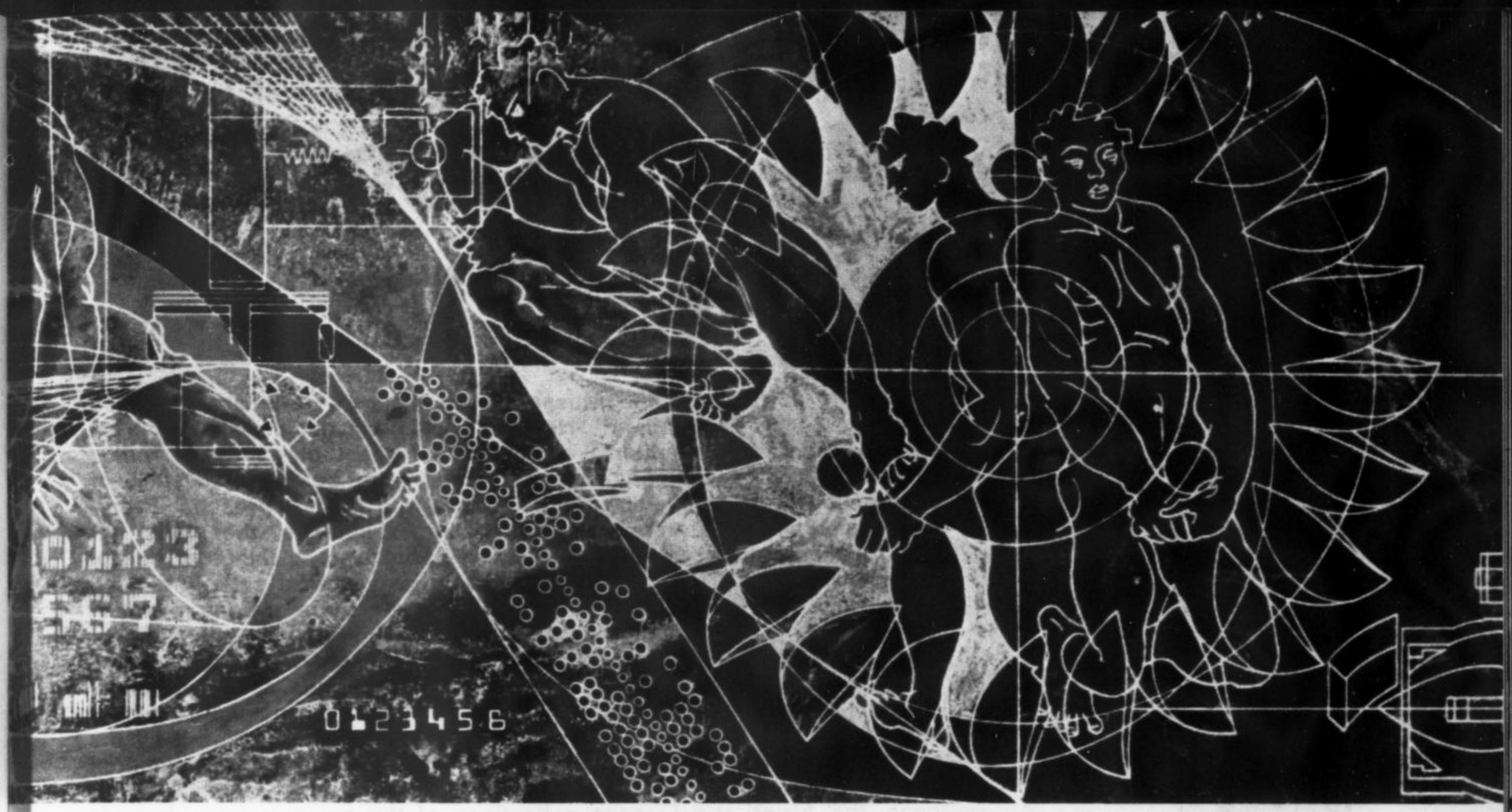
The problem is orders of magnitude easier than was believed even five years ago. The setting of birth rates and growth rates for a country is ceasing to be a matter of individual expense and resistance and is becoming a question rather of public policy and persuasion and effort. It is becoming a matter for conscious decision rather than collective drift. The wide-spread acceptance of this attitude in all countries and all religions is another plateau-step that may be taken in the very near future.

I have taken pains to enumerate these many areas where our civilization is beginning to be "past the middle of the S-curve," just because it is not generally appreciated how numerous and how central they are, or how convincing the evidence is that there are limits in sight. I realize that prediction is uncertain and that my conclusions are novel, but I think they are at least as plausible as the uncritical assumption that changes like those of the 20th century will go on forever. Marvelous developments lie ahead, particularly in biology, but I do not think they will make as radical a change in world society, as it is now being restructured, as the changes of the last hundred years made in 19th-century social systems.

If this is true, the present generation is the hinge of history. It may be no accident that the approach to maturation in different fields shows a concurrent pattern. Our new developments in power and communication and control all support each other. And they are supporting and being supported by the simultaneous changes in economic and social and international structure.

IT is those aspects of technological change that have been pressing humanity so rapidly toward becoming a closely interconnected species, a species in full possession of the world and its abundance and with an adequate capacity for control and survival, that are reaching toward mature and stable forms in this generation. They are forms totally different from those of our tribal warring past, but they might conceivably go on as long as the old forms did, for hundreds or thousands of years into the future. What is happening is that we are in the midst of being compelled to reorganize the internal structure and powers of the race into a mature human integration that could be called manhood.

As a result, I think we may be now in the time of most rapid change in the whole evolution of the human race, either past or to come. It is a kind of cultural "shock-front", like the shock-fronts that occur in aerodynamics when the leading edge of an airplane wing moves faster than the speed of sound and generates the sharp pressure wave



that causes the well-known sonic boom. The front edge of this pressure wave is the shock-front. It is a thin region where the low temperatures and pressures of the air ahead of the plane change suddenly to the high temperatures and pressures of the air immediately behind.

I think our present transitional crisis is a similar shock-front for the human race, buffeting us about as sudden changes in every direction come thick and fast. It is a multiple shock-front, with each type of exponential change reinforcing all the others. The Western world has encountered this cultural shock-front first—it is closer to the airplane of history, so to speak—but it would seem from the speed of industrialization of Japan and Russia that the rest of the world can be no more than 30 or 40 years behind. Throughout the world, the farm and city ways of historic man are being transformed rapidly to the ways of a high-technology world society.

But the shock-front analogy is also an instructive way of thinking about the times ahead. It suggests that after the shock-front has passed, we will have reached larger powers and interactions—higher temperatures and pressures!—but that the buffeting of change will be reduced, and the times will perhaps become psychologically and socially calmer than anything this generation or this century has known.

Life will go on being different, partly for the familiar reason that we will go on having more population and power, more communication and science, in every decade. But it will also be different in a different way, because the approach to a steady state is something rare in the history of the world. We see that humanity is on the verge of a new kind of life. I think an examination of the question of what it will be like could be one of our most constructive intellectual exercises today. It would show us how different our present problems and solutions appear, when seen in the perspective of the great changes and the different structures just ahead. It would help us see what we must do to make the changes less traumatic and to shape the structures more intelligently.

The problem of arms control, for example, becomes a different problem if it is seen as a temporary substitute for other ways of keeping the peace in a disarmed world. Innovations in education take on a different character when seen as part of the total improvement in education that will be needed for every child in the world in 50 years.

The need for philosophical integration of our new knowledge about the biological and intellectual and social nature of man takes on great urgency when it is realized that this is the substructure on which the social and political philosophy of our grandchildren's world must be built. Where are our Montesquieu and Rousseau today? What have Freud and the behaviourists taught us about irrationality and educability that would help us design a good society and a free and flexible society without the danger of recurrent instability? Are many different good societies possible, and can we choose among them or move at various times from one to another?

These are problems for extensive debate, but even without answering them it is easy to show that life in any steady-state world must differ in many respects from ours.

One of the unexpected differences, for example, will be the difference in age distributions and probably a related difference in family patterns. Throughout history, children have been a majority in most societies. The proportion of children to total population was high because so many were born who did not live to adulthood. It is estimated that at most times and places, half the population has been under age 15. Today in America, because of our post-war baby boom, half the population is still under 20. This makes a large "teen-age market" that many manufacturers are now trying to reach.

But in a steady-state world—no matter whether it has a smaller population than ours or one many times larger—the same number of people would be born in every decade and the same number would die in every decade. If our death rate in early life continues to go down, there will then be just as many people at age 40 or at age 60 as at age 10. And if they all live to about 80, as it now seems they might, then half of them will be over 40 and only one-fifth of them will be children under 15. It will be very different from the Indian village or the slum neighbourhood with children everywhere underfoot. The curiosity and laughter of children will be scarce, and world will begin to be run, even more than it has been, by the old.

A strange world, for us. But it could be a good world, if the old remain young in heart and vigour. They could use their great excess of adult-power, prosperous and leisured, to make the richest education for children that the world has ever known. Perhaps childless adults will move in with family groups, so they can share in the love and laughter of the children and spend endless hours in teaching them, in something like the old Hawaiian tradition. We may move away from our small-family separateness and back toward more tribal groupings as children become scarcer, and as

CONT'D ON PAGE 39

A statue, measuring 1.30 m. (4 ft. 3 in.) carved from a tree trunk. It was found deeply embedded in the ground. in a Dogon village (Mali).

THE LATITUDES OF BEAUTY

Above the entrance to the Musée de l'Homme in Paris are engraved these words by Paul Valéry: "He who enters will decide whether I am tomb or treasure, whether I am to remain silent or speak." Today, museum treasures are speaking louder than ever before. Museums of anthropology are broadening their horizons and their approach. Everyday objects from different lands are being exhibited to the public not only for their cultural and historical interest, but also as things of beauty in their own right. The cluttered collections may not be entirely a thing of the past, but anthropological museum curators are making a determined effort to attract larger groups of visitors from all walks of life. This new spirit is increasingly evident everywhere. We find it at the Museum of Anthropology of Neuchâtel, Switzerland, at the National Museum of Anthropology in Chapultepec, Mexico, the Museum of History and Technology in Washington. A noteworthy example is offered by the recent exhibition of the Masterpieces of the Museum of Man. One hundred works selected from amongst the pre-History, the pre-Columbian American, the Africa and Oceana collections of the museum were brought together first of all for their beauty as works of art and only secondarily for their anthropological and cultural interest. On the following pages the Unesco Courier is pleased to offer its readers a few glimpses from this unusual exhibition as well as its accompaning catalogue—a superb work of art itself—which featured illuminating texts by some of France's most noted anthropology experts such as Michel Leiris, Georges Henri Rivière, Henri Lehmann, Roger Heim and Françoise Girard.

AFRICA

by Michel Leiris

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LONG before the aesthetic reassessment which at the turn of this century led to the "discovery" of hitherto disdained arts, Europeans had begun to show interest in Negro art. By the second half of the 15th century, examples of work by Negro artists were already reaching Europe...

In the 17th century, a Jesuit priest, Father Athanasius Kircher, who is still remembered for his scholarly books on a wide variety of subjects, founded a museum in Rome (today the Pigorini Museum). It was to house, among other material, an important ethnographic collection which today includes stone statuettes brought from the Lower Congo towards the end of the 17th century.

Travellers were already expressing admiration for what they had seen on their journeys to tropical Africa. In 1668, Olfert Dapper of Holland described the city of Benin in glowing terms. In 1704, Willem Bosman, also

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MICHEL LEIRIS, *author and anthropologist, is a leading authority on Negro cultures of Africa and the New World, and is on the staff of the Musée de l'Homme, Paris. Few among his many published works have been translated into English. Among these: "Race and Culture" (Unesco, 1965; 3/6, $0.60) and "The African Negroes and the Arts of Carving and Sculpture" (in "Interrelations of Cultures, Their Contribution to International Understanding"), Unesco, 1953; out of print.*

MIGHTY OX DRUM
Though of strikingly modern appearance, this carving was actually discovered at the end of the 19th century in the Ubangui River basin of equatorial Africa. A huge tom-tom shaped in the form of an ox, it is one of the finest examples of the African drum-maker's craft. Carved from a single piece of wood, it measures no less than 2.29 m. (7 ft. 6 in.) in length. With the hollow belly serving as a sound-box, the drum was able to transmit messages over a great distance.

Photos © Musée de l'Homme, Paris

1915

The revelation of Negro art

Watching over a tomb from atop a wooden post, this couple symbolize the perpetuity of life. In south west Madagascar the burial grounds are filled with posts bearing similar figures. This one, 2.10 m. (5 ft. 8 in.) high, dates from the 19th century.

of Holland, recorded that, while visiting what is now Ghana, he had seen gold objects "of pleasing shape" and testified to the skill of the Negro goldsmiths. This tribute was confirmed a century later by the British Envoy, Thomas E. Bowdich, chiefly in his description of the ornaments worn by King Sai Tutu Quamina of the Ashanti people to receive the British mission.

Between 1795 and 1797, the Scottish doctor and explorer, Mungo Park, was struck by the skill of the Mandingan goldsmiths, and in 1884, a report by Ensign Besson, the first commander of the French fort of Grand Bassam, in the Ivory Coast, mentioned gold objects from the Ebrié district which "sometimes show a facility of design and an understanding of proportions rarely found among savage peoples."

Towards the close of the 19th century a number of scientific works appeared such as the studies by Leo Frobenius of Germany on the art work of various African tribes, and two English works by Charles Read in association with Ormonde Dalton and A.H. Pitt Rivers. All praised the ancient art of Benin although they attributed it to Portuguese influence, since in those days it seemed inconceivable that Africans could produce bronze and ivory work of such consummate skill all by themselves.

It was not until the early years of this century that "Negro art" gained full recognition. Artists in Paris, Dresden and Munich seeking to instill new life into Western art were drawn to African wood carvings which fascinated them and wherein they found not only inspiration but new notions that helped them to answer some of the questions that perplexed them.

The first person to write of Negro art as a great art worthy of being taken seriously was a member of this avant-garde group, the German poet and writer on aesthetics, Carl Einstein. His *Negerplastik* was published in Leipzig in 1915. It was a short work of little ethnographic value but of great aesthetic importance. In it Einstein set forth the intrinsic qualities of African sculpture in so far as it answered some of the problems which were then exercising the greatest exponents of European art.

The art of Benin, and indeed the earlier art of Ife, some remarkable examples of which had been found in 1910 by Frobenius, were already known to the world when the *Negerplastik* was published. But there was reluctance to regard these arts (which were strikingly naturalistic) as a genuine product of the African Negro. The Negro spirit was assumed to be fundamentally opposed to naturalism so that the Benin-Ife carvings were explained as the result of foreign influences introduced into tropical Africa.

Things have changed since then. We now appreciate far better than our predecessors did the great diversity of Negro art forms. If Ife art remains quite unique (the artists who produced the bronze heads and figures were naturalists who achieved a purity of form as majestic as that of the great Negro masterpieces conceived according to completely different norms), it is at least a factor which cannot be disregarded in any assessment of the plastic arts of the African Negro.

We are, moreover, beginning to form an idea of the Negro artist rather different from that which is even now too often current. His anonymity is now being recognized to be due essentially to the general absence of signed works (due in turn to the fact that writing is almost unknown in that part of the world) and to the scantiness of our information, which prevents us from recognizing that a particular work, considered of interest simply from the point of view of discovering to which ethnic group its creator belonged, may

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In this rider with raised arms the sculptor has depicted the figure of a mythical ancestor sacrificed in expiation of a ritual offence.
The 36 cm. (13 in.) wooden figure comes from a Dogon village (Mali).
Its patina of cinders shows that it long remained on the sacrificial altar.
All the legs of the mount (possibly a horse) have been broken.

MOUSE ORACLE

A contemplative figure, its back resting against a piece of pottery, reveals the grace which places the works of the Baule artists (Ivory Coast) in the front rank of African sculptures.
The pottery, 25 cm. '10 in.) high, was used for reading omens It fits into a circular wooden base and has two compartments, one above the other.
Two hungry mice were placed in the lower one.
The upper one held a tortoiseshell covered with millet on which ten small sticks were arranged.
Climbing up to eat the millet, the mice disturbed the sticks whose new patterns were interpreted by a soothsayer.

Photos © Musée de l'Homme, Paris

A KING AND HIS MUSICIANS

The sumptuous arts of the Ashanti kingdom (Ghana) are attributes of a great civilization in which guilds of artists were formed to meet the demands and elegant tastes of the court. The profusion and beauty of ornaments and precious objects astounded travellers who saw them as early as the 18th century. Left, a bronze kuduo or sacred vessel in which ritual offerings were placed. In the centre of the lid (detail below) the richly bejewelled king smokes his pipe of state. Around him are his musicians: seven horn players following the bearer of a double bell. A seated figure facing the king flourishes the royal sceptre. The vessel and its figures were cast by the lost wax process, a technique known throughout the lands along the Gulf of Benin, where the science of working gold and other metals became highly developed in the service of the royal courts.

Symbolism and beauty of design

have been executed by an artist of high local repute. This is a fact now established in respect of many areas of Africa.

As comparative study is extended, the African artist's products appear less stereotyped within a given style, and we are gradually coming to realize that, despite the weight of traditions, the artist still has a certain margin of liberty and can thus—in the best cases, of course—give his work a personal stamp.

While, since the *Negerplastik* was published, considerably more has been learnt about Negro art, and while there is no question that, even in its time, that work was seriously marred by an almost complete failure to understand the sociological context in which any work of art is set, it remains true that Einstein was able to show very clearly the priceless value of what the Negro sculptors have done and what any sculptor can learn from an examination of the forms taken by their works.

Reacting against the tendency of those who were first fired with enthusiasm for Negro art to concentrate on the beauty of the objects alone, without bothering about their exact significance, most of the anthropologists and others who have written on this subject in the last few decades have laid stress on the context of the works, which had been neglected by earlier writers on art, artists and art-lovers. But they have laid so much stress on the context that, when we read much of what has been written, we find the works themselves more or less obscured behind the web of beliefs and practices to which they correspond.

African arts are almost always highly symbolical and functional in nature. Yet, as many observers have noted, there is a growing tendency on the part of Africans to view their crafts aesthetically, as works of art, and no longer exclusively as functional objects or symbols.

Photos © Musée de l'Homme, Paris

GUARDIANS OF THE HARVEST
Carved on the door of a millet granary, three capped and bearded figures with bent knees call on the ancestors of the Dogon people (Mali) to protect the family harvest. The double herring-bone pattern bordering the panel symbolizes the rain which makes the millet sprout.

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OCEANIA

by Françoise Girard

Majestic and forbidding, this massive head once stood on the bare slopes of Easter Island in the Pacific. Carved from volcanic rock, it measures no less than 1.55 m. (5 ft.) The ancestors of the present Polynesian inhabitants hewed out, perhaps only three or four centuries ago, an enormous number of colossal statues (some weighing as much as 20 tons). With their backs to the ocean these figures stood like sentinels over the mausoleums along the seashore.

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AT first, the boldness of expression of the South Sea Island artists shocked Western taste. Based as they were on artistic canons completely alien to those we were accustomed to, their works were long regarded as curious, amusing, even grotesque and hideous—these words appear again and again in the accounts of the early explorers of the Pacific. It was not until the narrow confines of our aesthetic standards had been burst apart by such revolutionary artistic movements as fauvism, expressionism, cubism and, more especially surrealism, which was drawn to the art of the South Sea Islanders above all for its astonishing wealth of invention, that we came to appreciate its true beauty.

Attention concentrated mainly on the sculpture, as being more accessible and consequently easier to study than other forms of art. The paintings, many of them executed on immovable supports such as tree trunks or rock faces, are still little known, as are also the dances and music, by nature ephemeral.

Travellers to Oceania cannot help being impressed by the innate sense of beauty of its peoples. It is clearly visible in their everyday life and in the harmonious layout of their villages. In New Guinea, the dance square, the centre of community life, is surrounded by luxuriant vegetation forming a setting for the majestic house of the menfolk, with its high gable decorated with carvings of fantastic, symbolic paintings. In former times, the houses in New Caledonia were ranged on either side of a long tree-lined avenue leading up to the imposing dwelling of the chieftain, its entrance flanked by massive bas reliefs, its roof topped by a ridge pole ornamented with carved shapes silhouetted against the sky.

The artistic taste of these people is evident even in the humblest domestic objects, of finely burnished material, beautifully designed and decorated. For decoration is something more than mere adornment: it is an adherent part of the object, contributing in an important degree to its efficacy. Thus the Melanesian warrior believes that it is the ancestral image on his shield that defends him from enemy blows; and it was the protective figures fore and aft, no less than their nautical qualities, that inspired the crews of the big New Zealand boats with confidence in their vessels.

The image, in this part of the world, has lost nothing of its evocative power; it is closely associated with the being it represents. A man fashioning a statue of his ancestor thereby imparts to him material form and a certain measure of physical existence. When the spirit, hitherto invisible and intangible, has been enclosed by means of an appropriate formula, in the tangible symbol representing it, it will be more approachable, more accessible to prayers and offerings designed to solicit its help and protection.

A statue must be an object of beauty; but it has, in addition, a religious significance.

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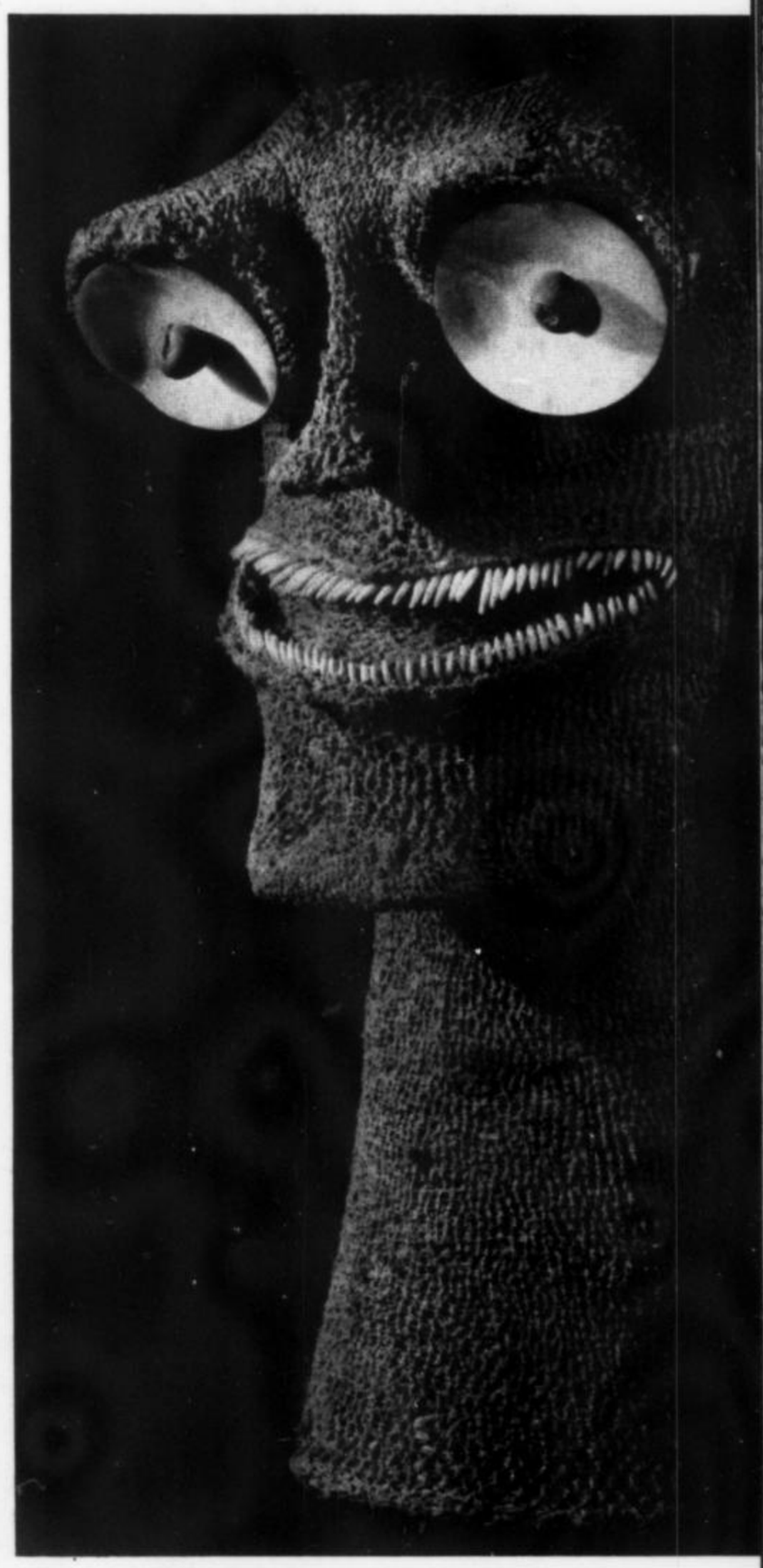
FRANÇOISE GIRARD *is an assistant director of the Musée de l'Homme, Paris, and curator of its Oceania collection. She has written many studies on anthropology and is the author of the chapter on Oceania in André Malraux's "Le Musée Imaginaire de la Sculpture Mondiale" (The Imaginary Museum of World Sculpture) published by Editions Gallimard, Paris, 1964, 29 F.*

The fearsome features of Ku-Kaili-Moku, a protective deity whose effigy accompanied the King of Hawaii on battlefields in the 18th century, when Captain Cook was making his voyages of exploration. Effigy shown here, 67 cm. (26 in.) is composed of a network of plant fibres stretched over a wicker frame; it has a rodent's teeth and mother-of-pearl eyes.



To fulfil its religious function, a work of art must obey certain laws governing not only the mode of production, but the design as well; it must conform to a traditional model which has been handed down from generation to generation, and proved its worth. The origins of any innovation in this field have to be vouched for. Significantly, dreams are regarded as one of the main sources of inspiration. During sleep, the soul is believed to leave the body and it may in the course of its wanderings enter the world of the dead and the realm of the gods.

The art of Oceania sets out to interpret a familiar world, and more especially the world of living creatures. Animals and the human form are its favourite subjects. Curiously enough, hardly any use is made of the decorative forms suggested by plant life, except in a few areas under Islamic influence.

From the outset it appears that the artist bases his design on a concrete example from real life. We watched a Melanesian mountaineer drawing a design that appeared to derive from his imagination; but he protested this was not so—no design could be invented, he said, and this one was to be found on the shell of an insect. It is quite possible that the geometric designs so typical of the westernmost Polynesian island groups were originally stylized versions of natural forms. Traversing these islands from east to west, we see the classical frieze, representing small dancing figures with arms and legs bent, becoming gradually simplified until it is reduced to a broken line.

The artist of Oceania does not seek to make an exact copy of his model. The statues fashioned for funeral ceremonies in New Ireland are clearly indicative in this respect. The traditional effigy does not bear the features of the dead person, but is adorned with the totemic emblems, known only to his relatives and intimates, the idea being that the effigy cannot then be used by ill-intentioned persons in order to harm the dead man's soul. Maoris, so as not to give the deity too human an aspect, depict him with a three-fingered hand.

In Oceania, the artist strives to produce a significant image by stressing those particular physical, psychic and social attributes he thinks most important. On the ridge poles of New Caledonia, keen-sightedness is represented by a protruding feature under prominent eyebrows. In the valley of the river Sepik, the long nose, regarded as a sign of beauty and virility, is exalted and so magnified as sometimes to resemble the long beak of a bird.

A sculptured statue is not so much a portrait as a symbol, into which the soul of the dead man can enter.

The main theme of South Sea Island art is the ancestor god; he it is who has inspired so many outstanding works of beauty which are for us a source of unending pleasure.

Colour pages

Eyeless in Nuokoro

This remarkable wooden statuette (35 cm. ; 14 in.) carved by an artist of the Caroline Islands (Nuokoro) in the Pacific, shows the human face and form reduced to its simplest denominator and is strikingly modern in appearance. Oceania art emphasizes the everyday world. Favourite subjects of Pacific artists: animals and the human figure.

Eyes of copper

Wooden figure (49 cm. ; 19 in.) entirely covered with copper strips and wire once topped a sacred casket of the kind used by many peoples of Gabon as a reliquary for the bones of ancestors. Gabon funerary images include heads and schematized figures such as this one by an Oseyba artist.

Beetle-browed mask

Sadness and mystery seem to be suffused across the face of this wooden mask from the Dogon country of Mali. The long indented bridge of the nose is accentuated by the jutting forehead and ears, the narrow mouth and square edged jaw. Mask is head of a monkey. (37 cm. ; 15 in.).

Sword to ploughshare

This life-sized, wrought iron statue (1.65 m. ; 5 ft. 8 in.) represents the good god Gu (or Ogun) now the patron deity of chauffeurs and auto mechanics and once the terrible god of war and metals. Extraordinary in the daring of its conception and balance, it is an example of the accomplished art of Dahomey. Emblems on rakish-angled headgear include hooks and hoes.

Peruvian painted fish

Detail of wall drape or mummy shroud woven in cotton (1.40 × 1.32 m ; 4 ft. 7 in. × 4 ft. 4 in.), found near Lima, Peru. The design of fishes is hand painted on the cloth, a technique in which Peru's artists excelled in most ancient times.

Functional beauty

This almost church-like figure adorns not a stained glass window of a European cathedral, but the upper half of a Melanesian shield from the Solomon Islands. Mother-of-pearl is fixed to tough wicker frame in long arrays of mosaic squares. Everyday objects are worked with great love for beauty of design. Figure is ancestor protecting hunter.

Maya dignitary

Stucco head found at Palenque (Mexico) where the great Maya civilization attained its zenith. Stylized motifs and figures fill the stucco-covered walls of Palenque, on which the Maya people have left an outstandingly-detailed record of their social ranks, dress, customs and physical traits.

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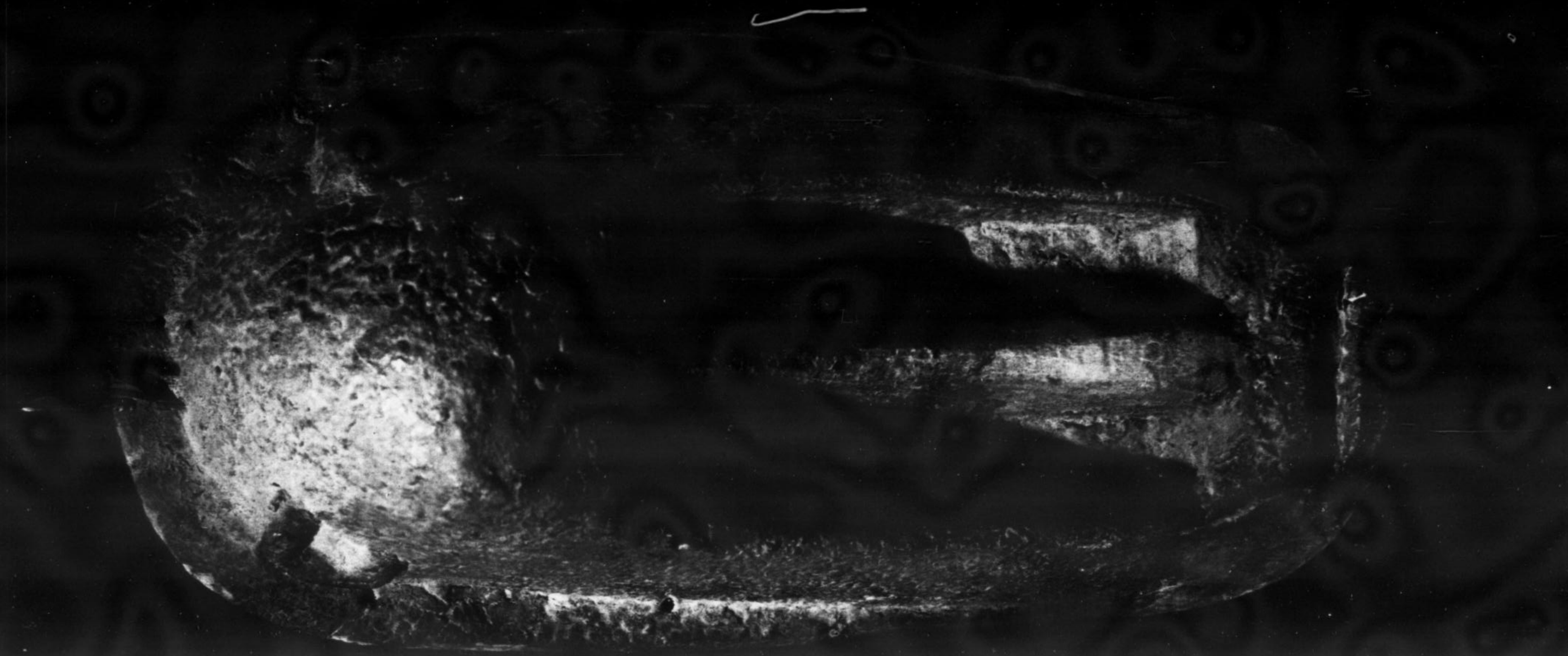

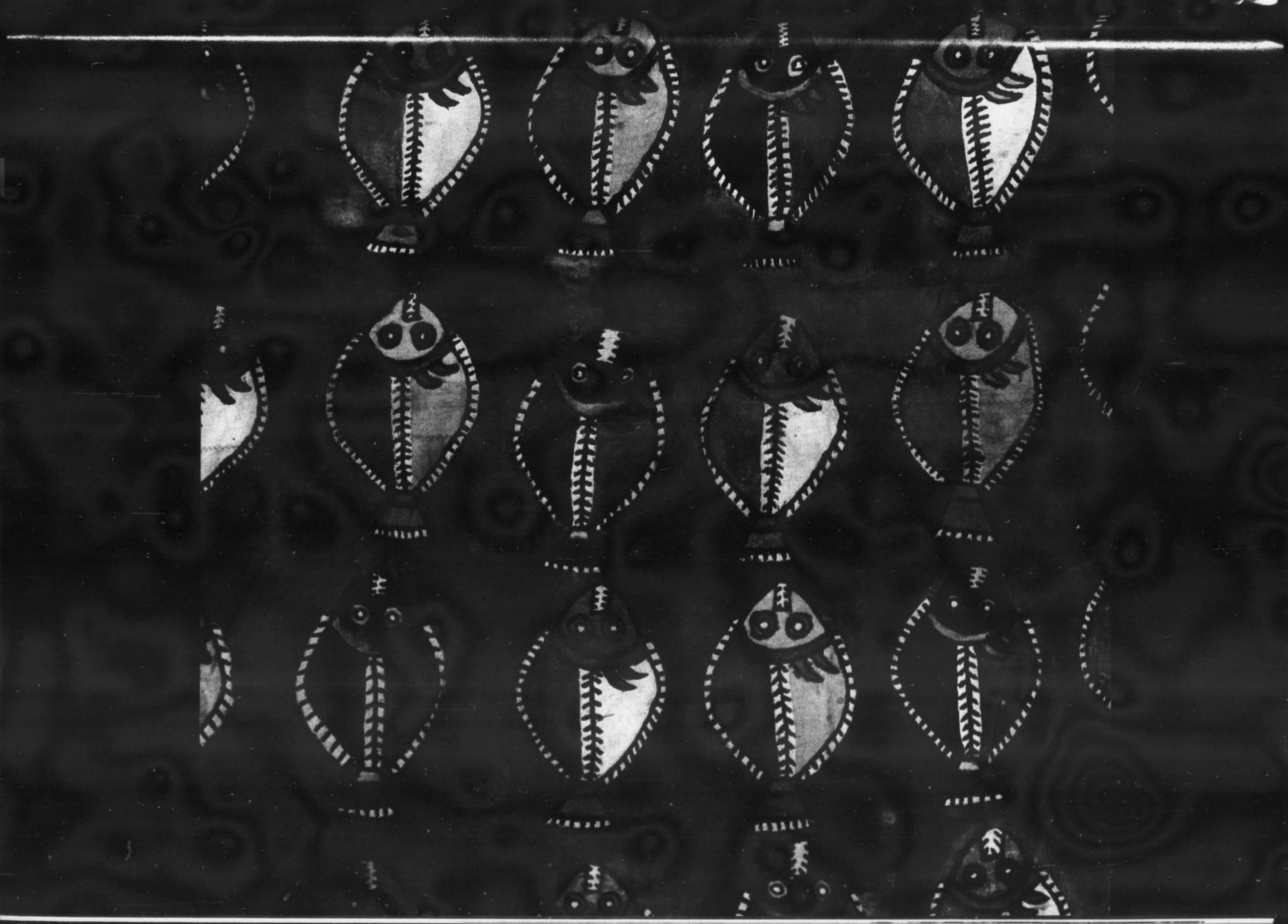

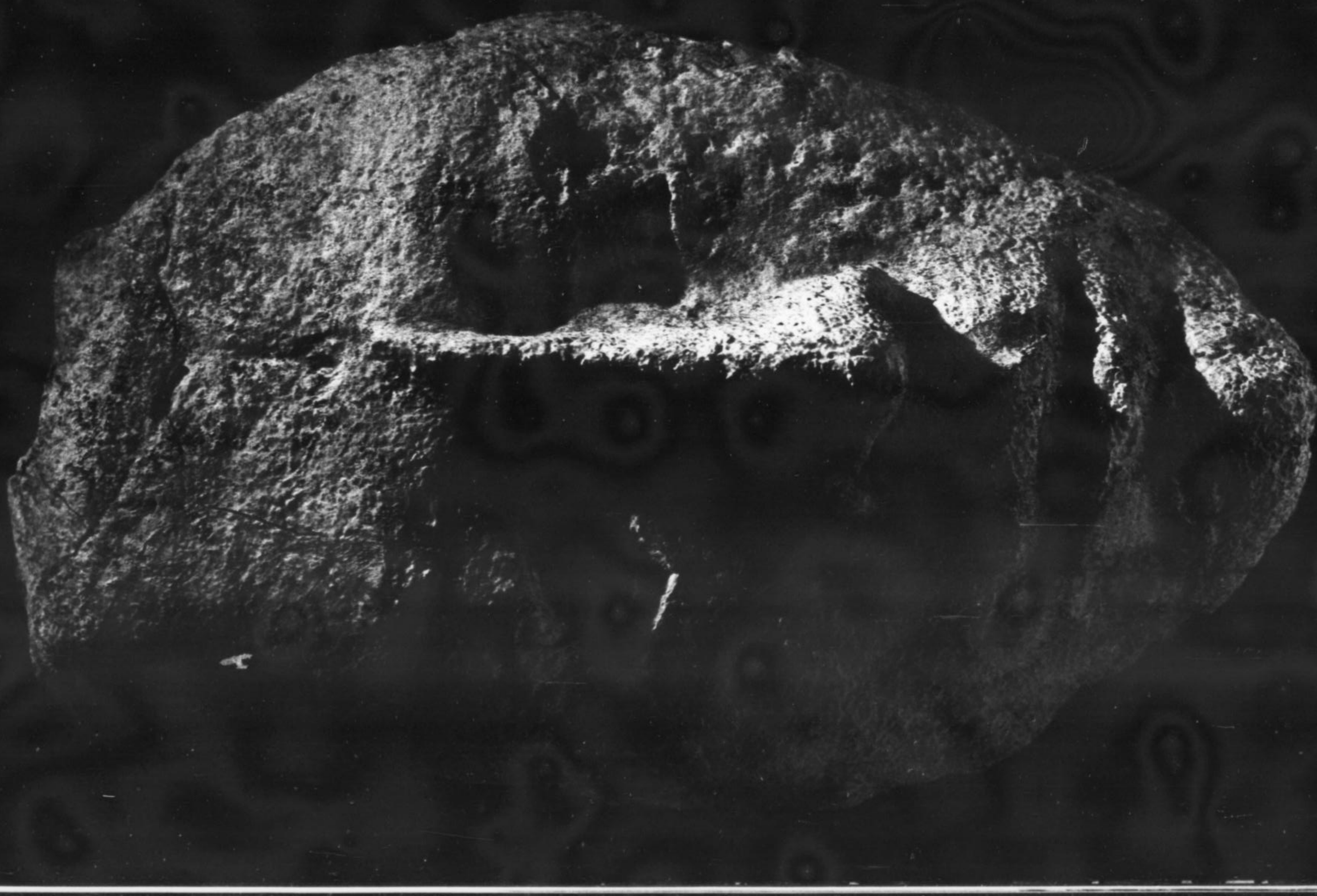

PRE-COLUMBIAN AMERICA

by Henri Lehmann

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LESS than a quarter of a century has passed since pre-Columbian sculpture, ceramics and metal-work first appeared in art exhibitions. Before being accepted as great art, the works of the peoples who lived on the American continent when the Old World was unaware of its existence were the subject of the most outlandish judgements.

The reaction of an artist of such undisputed taste as Albrecht Dürer to the first examples of American workmanship to reach Europe should have revealed from the outset that here was genuine art. In 1520 the great German painter had the opportunity of seeing the gifts which the Mexicans had sent by Cortez to the Emperor Charles V. Filled with wonder at the "subtle genius", of the inhabitants of the New World, he wrote in his journal that never had he seen anything so beautiful.

Among the first groups of Spaniards to set foot in America, who alone had the privilege of seeing the American civilizations still unspoiled, there were but few artists. Even so, some of the Conquistadores were enlightened enough to set other values on the jewellery than the mere market price of its gold. These men left chronicles filled with admiration for the ornaments of life in these American civilizations. Bernal Diaz del Castillo gives an enthusiastic description of the town of Tenochtitlan; in an inventory of the "treasure" of the Queen Anacoana, Petrus Martyr dwells on the beauty of the carved wooden seats called "duho . . ."

Nevertheless, the artistic merit of the objects brought back from America escaped most of those who saw them in the sixteenth century; people were simply surprised by their exotic character, till then unknown. These articles were much sought after but only in order that they might take their place in collections of curios. Fashions changed, and no more was heard of pre-Columbian products.

The end of the 18th century brought about a revival of interest in the ancient civilizations of America, now not so much for their external forms as for their content. The lead was given by Alexander von Humboldt, scholar of many parts, naturalist and ardent explorer. In the course of extensive travels in America, and notably in Mexico, he saw sculptures, illuminated manuscripts, divers vestiges of a bygone age. His scientific outlook impelled him to make an analytical study of these remains, and with his work began the systematic examination of Mexican manuscripts, and of the Aztec calendar and symbolism. "Americanism" developed into a science whose disciples became ever more numerous . . .

Some specialists of this period were interested in the religions, others in the history, and others again in the economic or social life of the continent. No one, however, was concerned with its art; all seem to have been quite indifferent to pre-Columbian aesthetics. This lack of understanding was blatantly displayed at the first international congress of Americanists, held at Nancy in 1875. The curator of the American collections at the Anthropological Museum in St. Petersburg declared:

"The monuments of American antiquity arriving in Europe will continue to increase in numbers, but not in beauty. We are even compelled to say that in the matter of art and aesthetics it appears that no antique civilization is worse off than that of America; a single glance at the collections in the Louvre is sufficient to convince one of this, and the St. Petersburg collection only confirms the impression . . . This absence of all plastic beauty in the works of aboriginal American art is a fact which may perhaps pass unnoticed by ethnographers and archaeologists, but which artists are coming to deplore, and which, in the eyes of the historian, is of supreme importance. For, in point of fact, he may infer from it that as the ancient Americans were entirely lacking in a feeling for beauty, so were they destitute of all moral sense..." The curator concluded this bitter attack with a merciless condemnation "Thus are these peoples (of ancient America) quite dead and buried; they lacked all lofty and noble aspirations and the sacred fire of great art was unknown the them..."

In 1928 the Pavillon de Marsan, in Paris, opened its doors to an exhibition of "The Ancient Arts of America", organised by Georges-Henri Rivière, in collaboration with Alfred Métraux. It created such a stir that the Berlin Academy of Fine Arts followed the example given by Paris and four years later presented a pre-Columbian exhibition. As a result of these exhibitions several important private collections were started. The Second World War interrupted the activity of initiates, but in 1947, on the occasion of the first international meeting of Americanists since the war the Musée de l'Homme in Paris exhibited its "Masterpieces of Pre-Columbian America," emphasizing above all their aesthetic character.

The choice of the word "masterpieces" was in itself an indication of the ground covered since the first congress. All the same, pre-Columbian art had still not really come into its own; it was described as a primitive art, even when it was admitted to be the product of "advanced" civilizations. The exhibition of 1947 only partially succeeded in conquering these prejudices . . .

How can we explain this prolonged denial of a form of plastic expression which today arouses such enthusiam? It is probably to a comparative study of this art and that of the Old World that we must look for the answer.

On either side of the Atlantic, peoples which up to the 16th century had had no contact with each other, invented and developed arts under such different conditions and with intentions so diametrically opposed that when they came face to face, they were unable to discover their own system of values in the opposite camp. European

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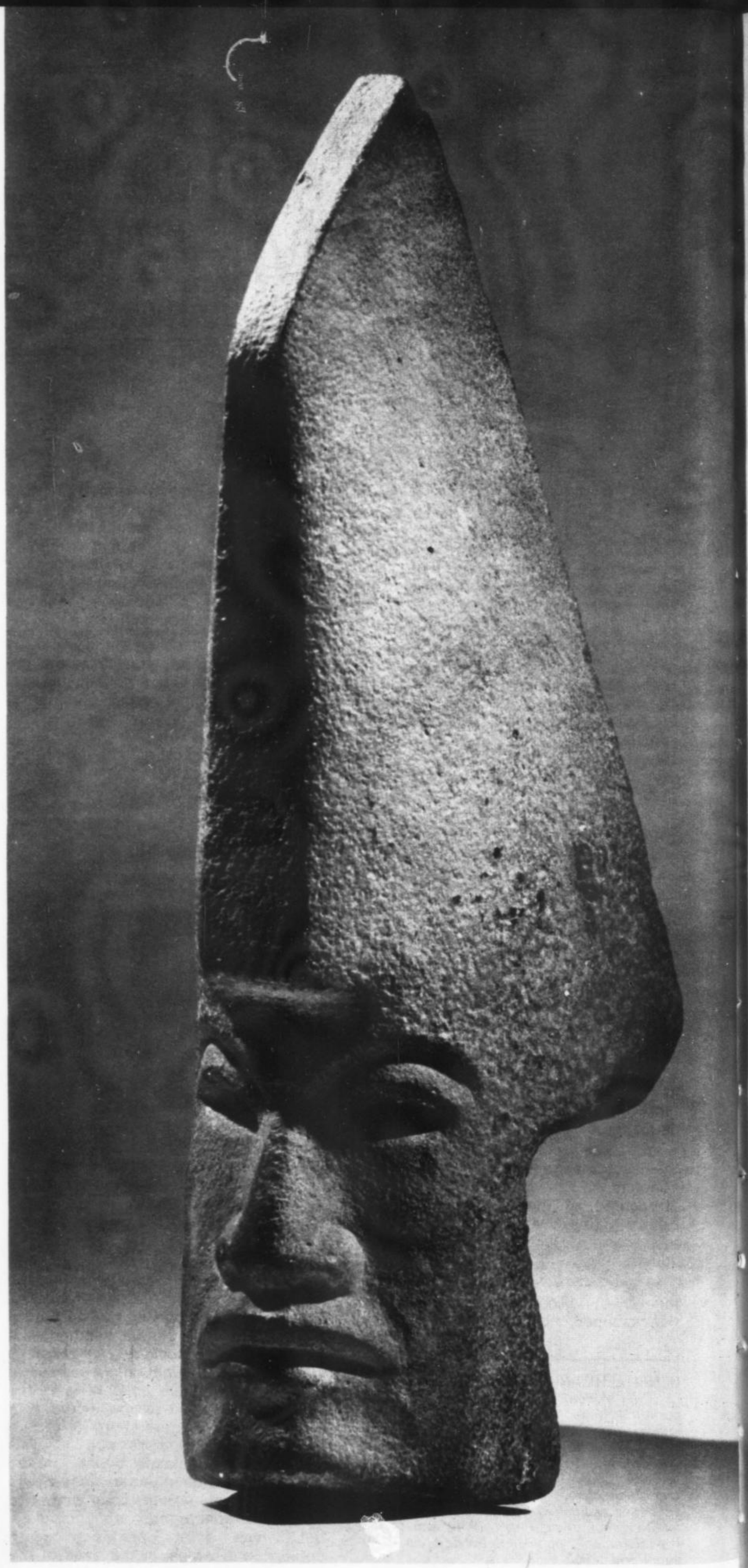
This austere mask with its high pointed head-dress is a masterpiece of the Totonac art which flowered on the coast of the Mexican Gulf over seven centuries ago. Carved in basalt, it is 38 cm. (15 in.) high, and probably served as an architectural decoration crowning a wall.



art is commonly defined as the expression through man's works of an ideal of beauty. The quest for beauty is not in itself the aim of pre-Columbian art ; art for art's sake was for the ancient Americans so totally inconceivable that certain critics have termed their art an extra-artistic phenomenon.

Nearly all pre-Columbian sculptures, paintings, ceramics, etc. are intended for cult purposes. They were used in the countless religious ceremonies performed according to elaborate rites, and for which the temples, statues, vases, vestments, and trappings had constantly to be renewed. The pre-Columbian Pantheon was exacting, and merciless ; what was expected from men was not, as in the Christian religion, a particular moral attitude, but food in the form of mortification, offerings and sacrifices. The gods required regular sustenance, and if men had abstained from their duty, they would have let loose the worst catastrophes: defeats, accidents, drought, even the end of the world. Thus the art of those who produced the objects of such a cult was not free and disinterested, but utilitarian.

As far as the ornaments and accessories of so tyrannical a religion were concerned, their office was to inspire terror, not love. Since these gods, beyond human understanding, could not be represented in a realistic human form, the tendency was to suggest their presence by a collection of symbolic elements, or again by a conventional group of realistic elements with no logical connexion between them. Hence those strange monsters which for so long shocked European eyes...

When the Greeks wished to portray Demeter, they gave her the form and features of any beautiful woman. The Aztec Coatlicue, as she is to be seen in the museum in Mexico City, has only a very vaguely human form; she is a Cyclopean block, adorned with serpents' heads, claws, and a necklace of hearts and severed hands. The statue evokes purely and simply the principle of generation and

MAYA WHISTLE
As it spread out over vast areas of central America, attaining its zenith between 300 and 900 A.D., the Maya civilization produced an art of exceptional richness and complexity. Left, Maya whistle in the form of a 19 cm. (8 in.) seated figure from Yucatan (Mexico). Maya whistles had a soft-toned penetrating sound.

THE GOD VENUS
Bearded head decorating an incense burner (below) was made by a 14th century Maya artist in Guatamala. It is believed to be an incarnation of Quetzalcoatl, the god of civilization, also represented as a feathered serpent and, in human form, as bearded and white skinned. Tradition taught that after bringing the arts and sciences to the Valley of Mexico, Quetzalcoatl became the planet Venus, and that as the morning star he would one day return from the east. When bearded white men eventually landed on the eastern coast, the myth was still so widely believed that it paralyzed any chance of organized resistance.

Photos © Musée de l'Homme, Paris

of destruction, the mother, and the tomb, of all temporal life.

The necessity of an enormous output to satisfy the requirements of the cult, meant that all the artists of the pre-Columbian period were pressed into its service. They were trained according to tradition, and organized into corporations, whose rules were as strict as those of the religious orders. One might call them craftsmen, for they were considered as such. When all were destined for the collective task, it would have been inadmissible for some to have been inferior to others: everyone was required to attain the same technical perfection.

A specialist, or a group of specialists—sculptors, painters, potters, or feather dressers—would be charged with a particular piece of work. This would have to be executed in conformity with strict predetermined rules, themselves an expression of the collective will of society. The style derives from these rules hence the very marked uniformity in the style of each site, or rather, of each tribe. On the other hand, the art of individual races is highly characteristic, and it is impossible to confuse one with another.

For example, the style of the Atlantes of Tula—Toltec work—has nothing in common with that of the famous calendar in the Mexico City Museum, which is Aztec work. Thanks to the fidelity of the pre-Columbian peoples to their art styles, it is possible to trace their migrations. Thus at Palenque we see the Mayas at the summit of their artistic achievement; when we come upon them again at Chichen Itza, their style is no longer pure; foreign motifs have been incorporated in it. They are the motifs created at Tula by the Toltecs, and brought with them when they came to settle at Chichen Itza...

Stylistic unity is the negation of individualism. It is difficult for us to imagine that art can attain its fullest expression without the individual contributions of artists, and it is from this standpoint that we admire the works of the great European painters and

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sculptors. But the individual contribution does not appear in pre-Columbian artistic creations. These are, moreover, never signed.

In Europe, we generally feel somewhat reticent about anonymous works, preferring that the object should bear a signature. It is more satisfying to our minds to be able to call by his name the creator of a statue of Aphrodite, of the Descent from the Cross, of the Holy Family or of the Pilgrims at Emmaüs, than to talk of that intangible and depersonalized being who was the master of Chichen Itza or of Tula.

It is true that *our* sculpture too remained anonymous during a part of the Middle Ages and that the statues of the cathedrals of Chartres, Rheims, and Strasbourg seem to us no less remarkable for all that. The fact is that these statues are so clearly differentiated in their detail that it is quite a simple matter to distinguish not only the various masters, but even the work of a master from that of his pupils . . .

Should we say then that pre-Columbian art is entirely destitute of individualism? It is tempting to reply in the affirmative; but it seems, nevertheless, that certain Peruvian works possess some individuality. The anthropomorphic terracotta heads of the North coast, which belong to the Mochica civilization, allow a glimpse, in certain unmistakable personal touches, of the hand of one particular artist . . .

Fifteen years ago, I attempted to prove that according to European standards anonymity and the absence of individualism are characteristic of what we term primitive art. Now it is not possible to describe as primitives the men who built the great Peruvian towns of Cuzco, Machu Picchu, and Cajamarquilla, nor again those who constructed the pyramids of Mexico, or of the Mayan zone in Guatemala and Honduras. They were undeniably great artists who had attained the summit of their art. Their spiritual motives alone had no connexion with those of European artists.

Their conception of technique may also disconcert the European observer. On this point, by comparing, or rather, contrasting the art of the two Worlds, Alfred Schuster has propounded a new theory (1). According to him, European art is fundamentally linear and "two-dimensional", the work being conceived in terms of lines and planes; pre-Columbian art, on the other hand, is plastic and "three-dimensional", its success depending on the balance of volumes . . .

Anonymity, an absence of individualism, a collective, social, magic-religious, perhaps also, three-dimensional nature—these are some specific features by which pre-Columbian art may be contrasted with European art; these probably are the reasons for which it remained so long ill-judged. That time is fortunately now past, and ancient America has henceforth acquired its proper status in the realm of great art.

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(1) Alfred B. Schuster: The Art of Two Worlds. Studies in pre-Columbian and European Cultures. Berlin (Gebr. Mann 1958) Ibero-Amerikanische Bibliothek.

This fragment of green-veined stone has retained the forceful expression of a funerary mask carved by an artist of the Teotihuacan civilization nearly 1,400 years ago. The peoples of the high plateau of Mexico fixed masks of stone (alabaster, porphyry and marble) on the shrouds in which they enveloped their dead.

© Musée de l'Homme, Paris

Two monumental works of Aztec art are shown here in the newly-opened National Museum of Anthropology at Chapultepec, near Mexico City. On the left, the great statue of Coatlicue, the earth-goddess. She has a human form, two snakeheads and the talons of a bird of prey. She represents all living things. In the background, the Calendar Stone, or "Stone of the Sun", a monolithic disc-shaped carving, representing the history of the world. In its centre is the face of the sun god, flanked by the four cartouches which singly give the dates of the four previous ages of the world and together represent the date of our present era. Historial accounts record that the stone was made in 1479 A.D.

National Museum of Anthropology, Chapultepec, Mexico

Masterpieces of ancient Mexico

DISCUSSING the richness and diversity of Mexico's ancient past, the noted Mexican scholar, Ignaz Bernal once wrote: "Just as Western civilization is the sum total of different national cultures, which we now call Italian, French of Spanish —perhaps individually unintelligible, but conjointly forming an intelligible whole—so the meso-American civilization is composed of former national cultures—Maya, Aztec, Zapotec, among others—which long ago came from a single stock."

Some 11,000 archeological sites have been found in Mexico, but it can almost be said that archaeologists have thus far barely scratched the surface. The people of Mexico were incomparable architects and builders. The British sculptor, Henry Moore, once said that the conception of volume and form in ancient Mexican art has never been surpassed in the entire history of sculpture in stone.

Pyramids and temples, massive figures delicate statuettes hewn from jade and marble, ceramics, works in terra cotta, carved steles and painted murals—these and many other works have come down to us from Mexico's past which goes back over 3,000 years.

Mexicans are now showing more interest than ever before in their country's past and are building museums to house this unique heritage. Last year in a single month no less than three new museums devoted to pre-Columbian art were opened in the country.

One of these, the National Museum of Anthropology in Mexico City's Chapultepec Park, former site of the Aztec royal palace, has over 200,000 exhibits, including what has been termed the finest collection of pre-Columbian art ever assembled. The second was installed in the home of Mexican painter Diego Rivera. It houses his immense pre-Columbian collection which he donated to the nation.

The third museum was opened in Teotihuacan, an ancient city in the

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Photos © Gisèle Freund, Paris

THOUSAND AND ONE CHARACTERS FROM THE HUMAN COMEDY

For nearly 2,000 years the pre-Columbian artists of central America displayed extraordinary skill and imagination in modelling innumerable figurines which record a thousand and one images from everyday life. Sometimes with malice, sometimes ingenuously, always with an astonishing vigour, they depict work, games, love, motherhood, dancing. The acrobat (opposite page) is a vessel modelled eight centuries before the Christian era by an artist of Tlatilco in the Valley of Mexico; one leg twists over to touch his head, the other serves as the mouth of the vase. The six figurines below, 23 to 55 cm. (9 in. to 21 in.), were made by the Pacific Coast civilization (Mexico) between the 4th and 13th centuries. A. D.

1 - Pelota player carrying a ball.

2 - Helmeted man brandishing a missile.

3 - Hunchback. Dwarfs and hunchbacks were often kept at the courts of the "caciques" (chiefs) because they were supposed to have magic powers.

4 - A roguish-faced figure holding a long tube used to collect agave juice from which an alcoholic drink was made.

5 - A seated woman rests her chin on one knee.

6 - Seated couples are favourite subjects. Here the man places his arm affectionately around the woman.

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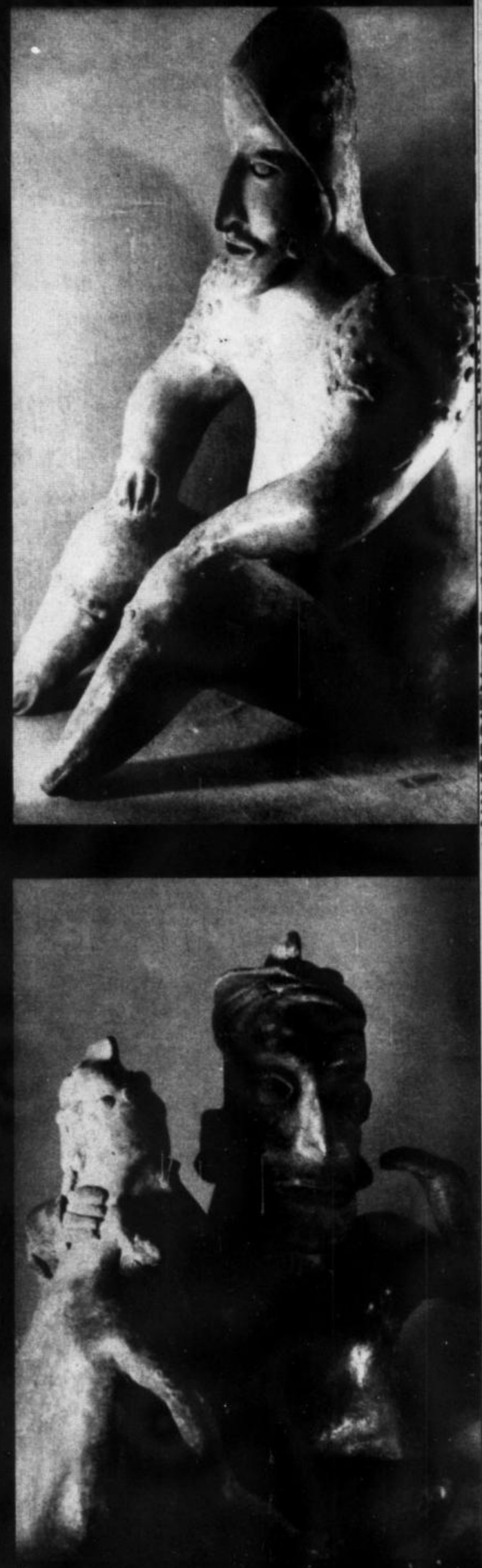

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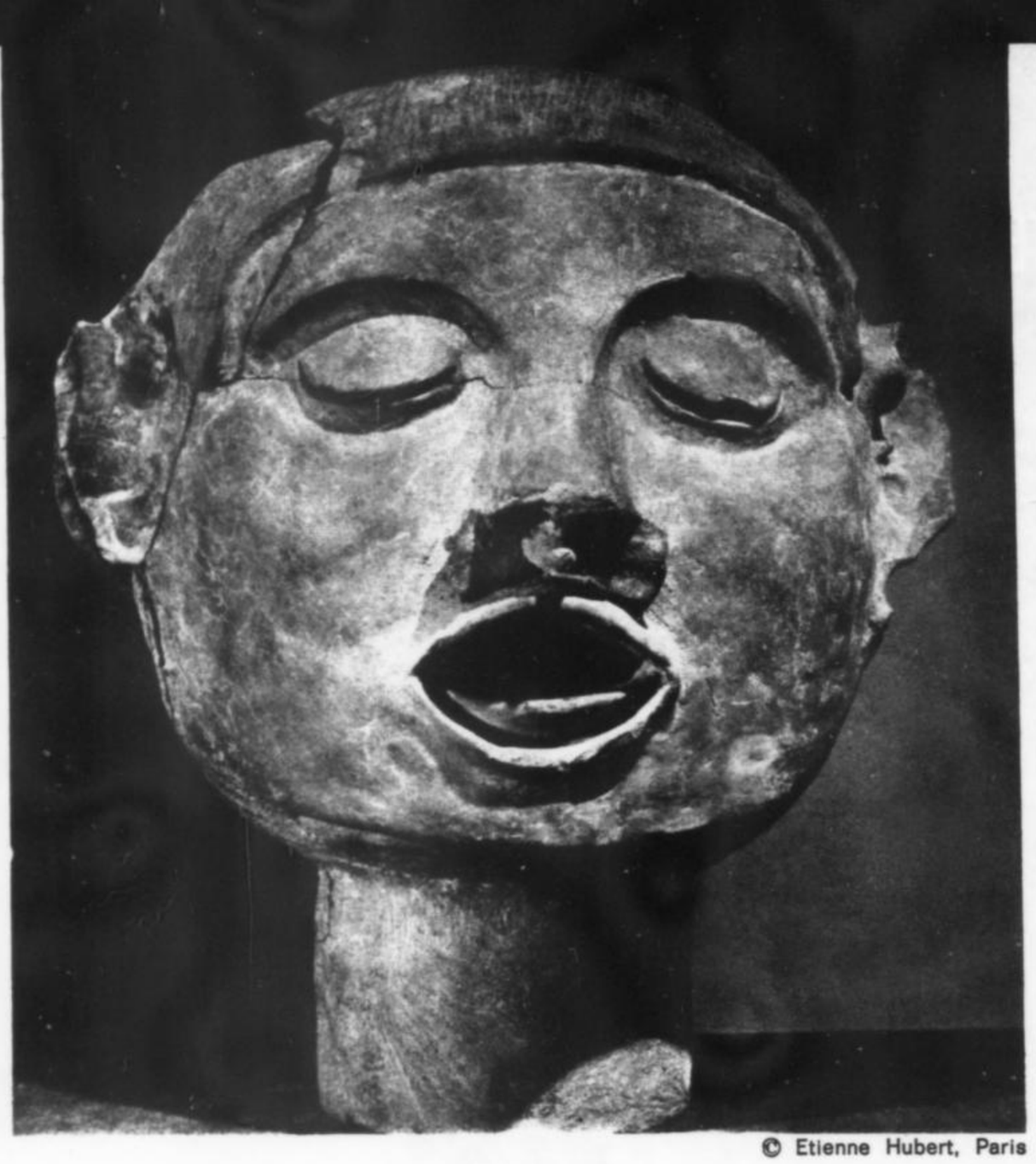

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GOD OF SPRINGTIME
The Toltec civilization spread over large areas of Mexico between the 9th and 13th centuries. A.D., leaving its imprint (the word "Toltec" signifies "artist") on famous Maya cities such as Chichen Itza and Uxmal. Left, head of Xipe-Totec, the god who symbolizes spring and seed time. This 38 cm. (14 in.) fragment of a terra cotta statue is now in the Vienna Anthropological Museum, Austria.

BREASTPLATE OF GOLD
Right, breastplate in gold, 12 cm × 9 (5 in. × 3 ½) representing the god of the shades. It was made by an artist of the Mixtec people, the great rivals of the Aztecs who lived in the Oaxaca mountains of central Mexico. Mixtec artists probably made the works which Albrecht Dürer saw at Antwerp in 1520, and which caused him to enthuse: "I have seen the things brought to the king from the new land of gold... Never in my life have I seen anything that afforded me so much pleasure. These are astounding works of art, and I was struck by the subtle genius of the people in these strange lands."

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EAGLE KNIGHT
Below, head of an Eagle Knight, a member of one of the great Aztec military orders. He wears a helm shaped like an eagle's head, a distinction reserved for the famous warrior knights of ancient Mexico (14th-16th centuries).

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ANCIENT MEXICO

(Continued from page 31)

Valley of Mexico, which attained its zenith in the 2nd and 3rd centuries A.D. only to decline and be abandoned by its people towards the 10th century.

Teotihuacan with its mighty temple-pyramids—the Pyramid of the Sun, 65 metres (213 ft. high) and the Pyramid of the Moon, 42 metres (138 ft.)—covered an area of 142 square kilometre (54 sq. mi.). The cultural, religious and historical fame of the city continued long after its decline and fall. But it was not until 1905 that archaeologists began systematic excavations. Today, completely uncovered and restored, the centre appears much as it must have done in the 3rd century.

In the course of these vast operations innumerable works in stone and ceramic were recovered. The works will go into the Teotihuacan Museum, itself a veritable museum-city in which the painted murals now being removed from Teotihuacan's walls will also be placed.

Deeply conscious that its pre-Columbian masterpieces are part of a universal cultural heritage, Mexico is preserving them in its multiplying museums, not as isolated relics of past civilizations, but in their original ethnic and social context—one which gives full meaning to their infinitely varied forms of beauty. A few examples are presented on these pages.

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THE GULF STREAM OF THE PACIFIC

by Konstantin Fedorov

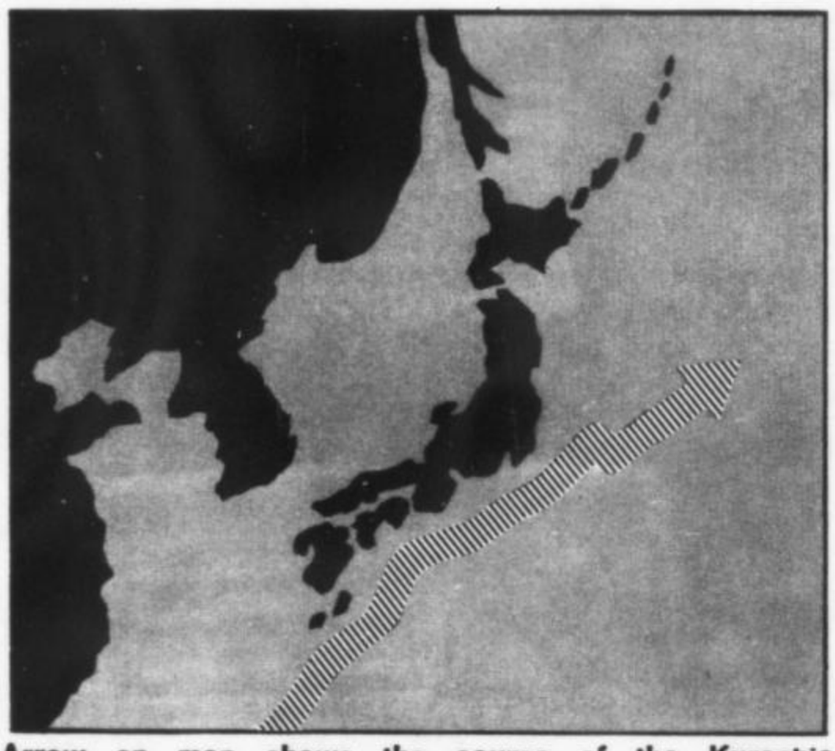
On July 1, 1965, the first comprehensive multi-ship survey of the Kuroshio Current in the Pacific Ocean began as part of the Co-operative Study of the Kuroshio and Adjacent Regions undertaken by the Intergovernmental Oceanographic Commission of Unesco. It is planned to carry on this work over several years. Thirty-six research vessels from six countries have undertaken the first phase of this study from July to October, thus embarking on another large-scale international oceanographic expedition aimed at unravelling the secrets of the worlds' oceans. Scientific exploration of this part of the ocean will undoubtedly increase the economic benefits to countries bordering it. It will also serve to develop scientific potential of the region by stimulating broader scientific interest and stronger national support for the programme. Delegates from the 54 member states of the Intergovernmental Oceanographic Commission met recently at Unesco's H.Q. to examine the first results of the Kuroshio study.

MOST people are familiar with the famous oceanic current called the Gulf Stream and may know that as it drifts eastwards across the Atlantic it transports enormous quantities of warm water, thus serving as a sort of "hot water bottle" for the whole of Europe. Fewer are aware, however, that the Gulf Stream and the temperature contrast it creates in the North Atlantic greatly facilitate the formation of the atmospheric disturbances known as cyclones which are of such concern to European meteorologists.

It is perhaps strange, but true nevertheless, that even less people have heard of the Gulf Stream's sister current in the Pacific called the Kuroshio which, in its part of the world, plays a role in many ways and for some nations even more significant than that of the Gulf Stream in the Atlantic area. Of course, my Japanese colleagues might point out that there is hardly a schoolboy in Japan who does not know about the Kuroshio, and this is true since the whole life of this country depends on this strong and warm oceanic current.

We are familiar from childhood with rivers and quite naturally think that every river should have its shores. The Gulf Stream and the Kuroshio are rivers without shores —great rivers in great oceans.

They are by no means undiscernable on the vast and deceptive uniformity of the oceanic surface. Kuroshio is a Japanese word meaning "black current." Seen from an aeroplane it manifests itself by a sudden change in the water's colour from azure to deep cobalt blue, almost ultramarine. An observant passenger on a steamer seeing



Arrow on map shows the course of the Kuroshio Current in the Pacific Ocean to the south of Japan's coastline, where its speed sometimes reaches 8 ft. a second.

flocks of sea birds on the water's surface would immediately recognise the northern edge of the Kuroshio for, first and foremost, an ocean current means "life."

In 1957, during the International Geophysical Year, I was with a group of scientists looking for the Kuroshio aboard the U.S.S.R. research ship "Vityaz". We were sailing south along 150°W and had already left behind those latitudes where, according to all the textbooks, the Kuroshio should have been found. Its absence was intriguing to say the least. To our relief we came across it later, displaced southward by a few hundred miles. As in many other cases, the birds and flying fish were our first informers.

This shift southward of the Kuroshio was one additional proof in the steadily accumulating facts showing that the striking similarity in appearance between great oceanic

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Polychrome woodcut print of Mt.Fuji seen under the wavetops, executed by the great Japanese artist, Hokusai (1760-1849).

currents and ordinary rivers goes farther than simple poetic metaphor. Like rivers on a plain, the Gulf Stream and the Kuroshio are given to meandering through the oceans. These meanders change their form and wander along the stream in their own way, just as river meanders do, although on a different time scale.

The speed of such an oceanic river as the Kuroshio is quite amazing. While its average speed is slightly over one metre per sec., its maximum speed south and east of Japan sometimes attains as much as two and a half metres per second which is comparable to the speed of many continental rivers. This "river" is approximately 400 metres (1,300 ft.) deep, 40 nautical miles wide, and transports an average of about 50 million cubic metres of water per second. To visualise this mass of water one would have to join together about five thousand rivers as big as the Volga.

Having read all these facts, the reader may think, "But scientists seem to know quite a lot about the Kuroshio. Why go to sea and study it, and even mobilize international efforts for its scientific investigation?"

Well, at this point ends the poetic analogy between rivers and oceanic currents. While we know for certain that rivers flow down the slopes of continents, fed by underground waters stored as a result of rainfall, nothing as definite is known about oceanic currents except that their major moving forces are the wind over the oceans and dissimilarities in heat and salt distribution in oceanic water.

Even this knowledge is not absolute, since any combination of these forces is possible and the forces of friction and inertia, as well as the earth's rotation, also affect oceanic currents in different and complicated ways, making some of them strikingly similar (as the Gulf Stream and the Kuroshio) and some of them totally different from each other.

Again the reader might ask "Can currents in the ocean be of different kinds?" They can, and to learn their nature is a difficult task, still far from being solved. It would perhaps be too technical to describe here what we actually know with regard to the physical origin of the so-called boundary currents such as the Kuroshio and the Gulf Stream. So I will simply say that there already exists a general hydrodynamical theory of boundary currents, although the character of the complex interaction of the forces mentioned above which can account for changes in both transport and geographical position of the Kuroshio, its meandering, and many other associated features is still far from clear.

These changes are by no means insignificant. The total transport of water, by the Kuroshio may deviate by about 50% from the average figure of 50 million m^3/sec already mentioned. And no simple analogy with rivers, which have a clearly seasonal cycle, is possible. Comparison of the Kuroshio with the Gulf Stream, which would involve looking closely at their similarities as well as their differences, may help to throw some light on this problem.

Studying the dynamics of the Kuroshio could, of course, be a purpose in itself, but it is not the only aim of the Co-operative Study of the Kuroshio and Adjacent Regions which started in July 1965 under the co-ordination of the Intergovernmental Oceanographic Commission. However,

The vagabond, bountiful stream

if we learn how to explain the behaviour of the Kuroshio, we shall also learn how to predict it. As a consequence, improved weather forecasting for the vast area influenced by the Kuroshio and increased and predictable fishing will become possible.

To ensure these benefits, complex studies of the Kuroshio will need to be made covering all the appropriate fields of knowledge, including meteorology, marine biology and fisheries. Perhaps the greatest effort to be undertaken by the participating countries lies in the field of fisheries research. But marine geophysics and marine geology will not be neglected in view of the increasing importance of mineral resources from the ocean.

I have said that a current in the ocean means "life". This implies that some parts of the ocean may be more productive than others, just as are different kinds of soils on the continents. The southern edge of the Kuroshio, for example, marks a distinct boundary of a quite definite marine biological environment. Numbers of commercially important species of fish, and even whales, do not generally penetrate southward beyond this boundary. Thus, this region of the Kuroshio offers local fishermen a series of important fishing grounds which may shift and change both in space and time.

To predict these changes careful studies will need to be made of the influence of various environmental characteristics on fish behaviour through the whole reproduction cycle. Thorough knowledge of changes in all the elements of what is known as "food chains" in the ocean is also very important. A programme of such studies for the Kuroshio region, if written out in detail, would probably occupy a thick volume in itself.

We have swung from a very theoretical interest in the co-operative study of the Kuroshio to a very practical approach to it. Between these two there is an enormous number of scientific problems awaiting solution. Why, for example, does an area of cold water form now and again south of Japan between the main stream of the Kuroshio and the coast and remain there for long periods, affecting weather and fishing? Why does the Kuroshio penetrate the East China Sea instead of following the Ryuku Islands chain on their oceanward side? Why does the Kuroshio leave the Japanese coast at approximately 35°N instead of following it farther north?

Countless "whys" come to a scientist's mind when he approaches a natural phenomenon of such magnitude as the Kuroshio and, as his study proceeds, for every question answered, ten new ones might appear.

Scientists look with expectation to the results which the co-operative study of the Kuroshio will bring. New knowledge is always exciting although perhaps quite a number of years will pass before something really spectacular from the layman's point of view will occur, either in terms of scientific discovery or in terms of the application of this new knowledge.

In this sense, the co-operative study of the Kuroshio and the results which are expected have nothing in common with those spectacular quasi-scientific projects reaching us from the domain of science fiction where high oceanic dams are built and warm waters of oceanic currents are deflected to warm up countries suffering from the cold, or to melt Arctic ice. It will be laborious work with slow but sure progress—a constant search for answers which modern man dares to ask from nature.

International oceanographic expeditions have become a reality of our time since the International Geophysical Year (1957-1958). It would perhaps be of interest to say a few words as to how these expeditions are now being organized.

Although the centre of the day-to-day co-ordinating activities is located in the secretariat of the Intergovernmental Oceanographic Commission in Unesco's headquarters, the soul and spirit of such an expedition is the international co-ordinator appointed by the commission. He must keep in constant touch with national co-ordinators of participating countries and initiate important measures to improve communications and the exchange of data and information. He also serves as chairman of the international co-ordination group which is the major planning mechanism of an expedition.

Nor should one forget the data exchange system which is a very essential element of the whole expedition and which, in the case of the Kuroshio study, comprises not only two World Data Centres (in Moscow and Washington) but also a special Kuroshio Data Centre which has recently been created in Japan.

The new international expedition has as its major elements

- overall coverage of the whole vast system of the Kuroshio by scientific observations from ships and shore stations in different seasons,
- continuous or regular (and frequent) observations in selected areas representative in certain ways of the whole system.

While the first approach will provide scientists with a sort of "photographic picture" of the current, the second will ensure liaison between successive "snapshots" and, still more important, will enable scientists to study the variability of the Kuroshio. When you realize that the Kuroshio system spreads for thousands of kilometres, it is easy to understand that, for a programme based upon the above principles, many ships and many more scientists are required. This explains the need for international co-operation, for bringing together ships, scientists and experience. Therefore, an international expedition is really the only solution to this problem.

EIGHT years have passed since the International Geophysical Year, and this year I was again aboard a research vessel in the area where, in 1957, "Vityaz" made its observations. This time the vessel was "Atlantis II" of Woods Hole Oceanographic Institution (USA) —one of the participants in the co-operative study of the Kuroshio. Scientists aboard were aware of the work which had been done there before by ships of other nations and therefore the planning of new work proceeded on the basis of knowledge already available. New instruments were going down into the cobalt depths of the ocean, and from these observations a new pattern was already emerging, embodying in a single, coherent system the valuable information obtained from earlier research.

Aboard "Atlantis II", and no doubt also aboard many vessels heading towards the open sea these days, there was a feeling that the science of oceanography has finally become truly international.

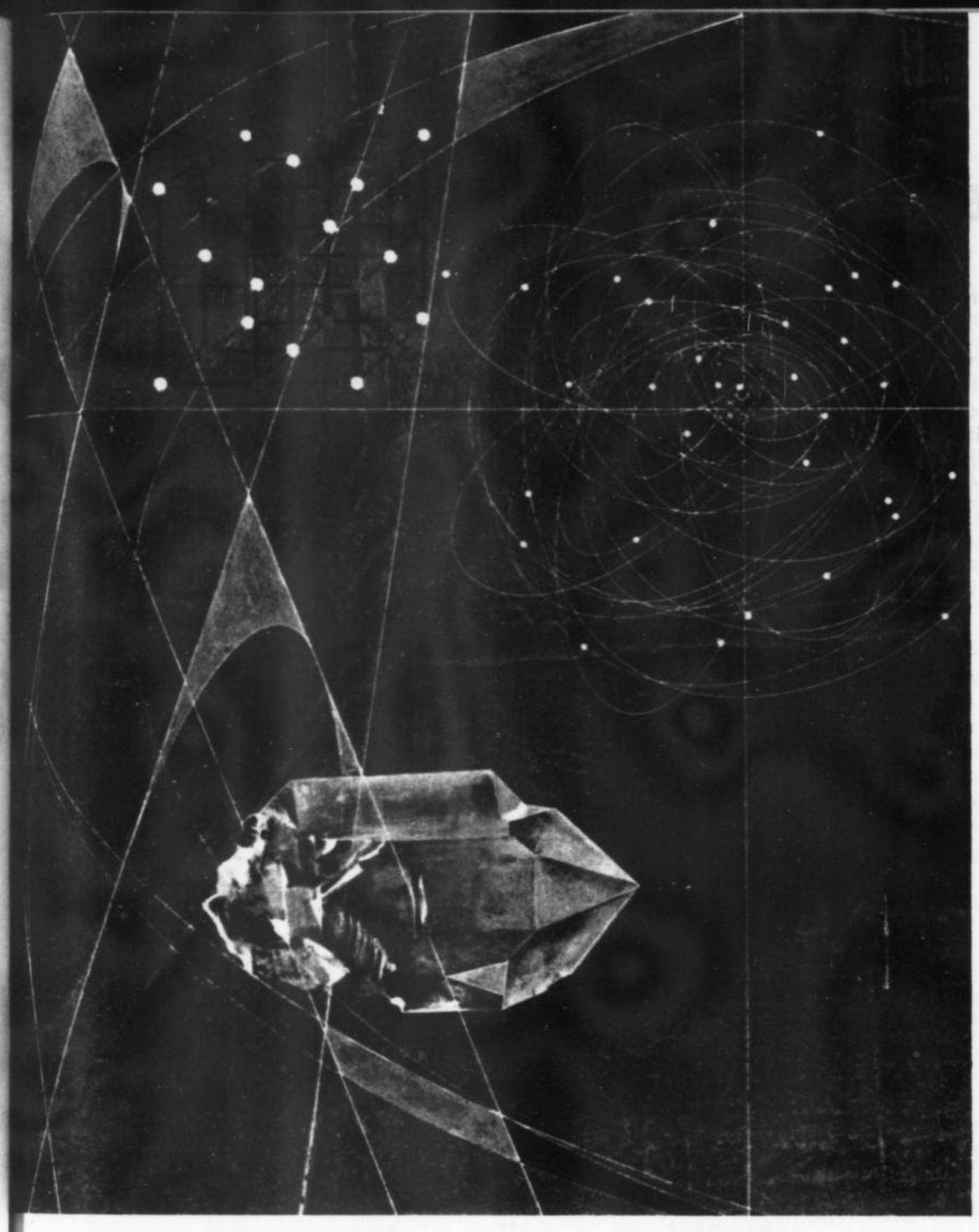

Illustration by Hans Erni, from "Science", the first of a series of eight volumes composing an international compendium of modern knowledge published by the Macdonald Illustrated Library, London, and Doubleday, New York. Prepared by editorial boards headed by such distinguished scientists and scholars as Sir Julian Huxley, J. Bronowski, Sir Gerald Barry and James Fisher, the series has already been translated into seven languages. The artist and designer is Hans Erni.

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THE STEP TO MAN

(Continued from page 9)

the reduction of the speed of change makes it easier for the different generations to talk to each other again.

What will we do with our time in that leisured world? Undoubtedly there will be still more travel and more vigourous and daring outdoor recreation. Life will be dull otherwise. Perhaps thousands will climb Everest and millions will ride dolphins. But I think the activities that will really begin to bloom are the creative arts and education and science. Not just Sunday painting, but Wednesday-Thursday-Friday-Saturday-Sunday painting. Continual rebuilding of your own home to your own taste, filling it with personal ingenuities and bold designs, might become the fashionable thing to do.

And education and science may become activities for everyone. Who kept up with the philosophers of the French Enlightenment? The leisured classes of the drawing rooms. Who did science, at first? Rich amateurs and leisured clerics with an easy routine and the time to do experiments. Already education and scientific research are our fastest-growing industries. With pre-school enrichment raising the level of intelligence, as some evidence now indicates, perhaps increasing numbers will profit from education all the way to the graduate level, and continuing education for much of the population may become a lifelong activity.

Likewise in science, many adults may fix up a laboratory room in their houses, where they can work every day at some scientific project, some study in crystallization or in embryology or in teaching animals that could offer a lifetime of unfolding discovery.

One other characteristic of a steady-state world that deserves special mention is its requirement for a high standard of social justice. If we survive at all, after this great disturbing shock-front has faded into a phenomenon of history, it can only be by working out a new attitude of tolerance and mutual support for each other, between coloured and white, between rich and poor, between advanced nations and retarded ones. The unemployed, the underprivileged, the underdeveloped, all the groups neglected or exploited by our present arrangements or condemned to exclusion from our prosperity by the accident of parentage or place of birth, form a perpetual seedbed for spokesmen and would-be dictators whose juntas may take over nuclear administration in the name of correcting these wrongs.

Our failure to eradicate these evils depresses the standard of living and shortens the probable "half-life" of everyone. We are now realizing this, in the U.S. Congress as well as in the councils of the world. What is fortunate for us today is that our new understanding of the educational and developmental basis of prosperity has made it possible and profitable to cure these evils just at the instant when our new weapons technology has made it absolutely necessary to do so.

We can no longer afford poverty in the world—if we ever could. We can no longer afford ignorance or prejudice or neglect. It is not so much that they are a sign of moral wickedness as that they are a sign of incompetence in design and administration. It is time to apply at least the same standards of competence and satisfaction in running the world that we apply in running a family or a business. Any member of the world now not only deserves to be shown, but must be shown, as surely as a member of a rich man's family, how he can share in its abundance. Any child in the world now not only deserves to have education, but must have education, like a privileged child, for the full development of his potentialities from the age of one year on up. It is necessary not only because we can afford it but because we must afford it.

CONT'D ON NEXT PAGE

A new knowledge and new biology

The world has now become too dangerous for anything less than Utopia.

Will it all be static in this strange new world of the steady state? The answer is no, nothing will be static. What will begin to be steady is our acceptance of these new ways of creative leisure and interaction as being the most interesting and most satisfying ways of life. But all our indices of flow, production, commerce, communication, will be up from what they are now. The marvelous accomplishments of a mature and integrated society will be just beginning. And two fields, scientific knowledge and biological technology, will surely go on changing and developing indefinitely.

I see no end to the increase of knowledge. When scientific research has as many men and as much money every year as society can afford, it will be adding even more rapidly than now to our knowledge of nature and to the ease with which we can control nature. And this world of nature is infinite to us, for it includes the human brain itself. After all the myriad galaxies of the astronomers are charted as well as we want to chart them, we will still go on studying the multimyriad complexities of the brain that has measured them.

OUR knowledge of nature will surely be used increasingly for the improvement and variation of our biological apparatus for living. If we can actually set up a social structure that will enable us to live together without killing ourselves, for a thousand years or a million years—a time as long as the time since man began—it will begin to give us the time we need to understand and develop our full biological potentialities.

Things we now cut out of the human body by surgery—the appendix, the tonsils—can they be eliminated from the hereditary genes instead? Our eyes and ears that give out when we are old, our hearts and arteries—why not make them better biologically from the beginning rather than by doctoring after they begin to fail? We begin to see the possibility of reshaping the human organism, as we have been reshaping plant and animal organisms now for many years, into a new form or into many new forms that will begin to show the full potentialities of protoplasm and the creative brain.

In such a time, man will cease to be at the mercy of the evolutionary accidents that made his frame and his society —just as he has ceased to be at the mercy of the biological accidents that made his diseases. It will be a time when man can begin to plan what he wants man to be, as each individual makes his personal plans today—a time when accident and drift will finally begin to be replaced by conscious human values and decisions.

The accelerating powers and dangers and hammer-blow stresses of these days make us anxious and afraid. But I think it is clear that if we survive this shock-front, this roaring waterfall of change, we could be within sight of what Churchill once called the "sunlit uplands".

Various metaphors could be used to describe the situation. In many ways, it is like a child learning to ride a bicycle. There you were, up until that day, riding on the three-wheeler where you couldn't hurt yourself very much. But then you get the two-wheeler, and it seems terribly scary, and perhaps you fall and skin a knee or an elbow. But you get up again, and your father holds the handlebars, running along beside you, and suddenly you are riding alone.

At one instant you are incompetent, falling to one side or the other and steering wrong, and the next instant it comes right and you are in control, safe and balanced not because you are fearful and slow but because you are going faster than ever. Wobbling and weaving but nevertheless choosing your *own* path and balancing safely at every turn. So, I think, in 30 or 40 years, if we survive, the human race will come through this time of wobbling conflict and uncertainly and falling, and will suddenly be riding in its own chosen direction, free, as only a co-ordinated and confident organism can be.

To say it another way, it is like the time of adolescence, when the teenager suddenly changes, with some thrashing about, from the dependent child to the independent man. Or it is like the moment of birth, full of pain and danger as the baby in the womb is suddenly pushed through into a new life where he must breathe alone and learn to walk and talk and think. Or it is like the moment of metamorphosis of the insect, when there is an incomprehensible swelling and dizzy changes of shape and desire in the tight cocoon, until suddenly it bursts open at the end of its own sharp S-curve, its own era of change, to reveal an unimagined transformation to a new free winged life.

This is the meaning of the leveling off of our S-curves. We are now nearing the end of the era of change. We have been isolated human beings, selfish, combative, ignorant, helpless. But now for several hundred years the great evolutionary hormones of knowledge and technology have been pressing us, almost without our understanding it, into power and prosperity and communication and interaction, and into increasing tolerance and vision and choice and planning—pressing us, whether we like it or not, into a single co-ordinated humankind.

The scattered and competing parts are being bound together. Everywhere now we begin to see men and nations beginning the deliberate design of development with a growing confidence in the choice and creation of their own future. The exponential changes have burst apart our ancient attitudes and structures, and our failure to adjust to this may yet kill us, but if we are wise and energetic and understand our own nature and purposes well enough to restructure and control these dangers, mankind may emerge very quickly into co-ordinated forms such as it has never known before. Our drastic changes will not go on forever. They are converging to a limit. It was implicit in the biological material all along, as surely as the butterfly is implicit in the caterpillar. We have been men. We are emerging into Man.

YET no analogy, not even that of metamorphosis, quite captures the suddenness and radicalness, the really complete restructuring, of the transformation ahead. If the 2,000 million years of life are represented by the 200-foot height of, say, the Rockefeller Chapel at Chicago, the million-years of man make a 1-inch block on top of the chapel. The 20,000 years of agriculture make a thick postage stamp on top of that, and the 400 years of science make the ink on top of the postage stamp.

Now, suddenly, we see what all this has been building up to; and it is about to come within a single generation or two— that is, in the thickness of the film of moisture on top of the ink on the postage stamp. In that short time we will move, if we survive the strain, to a wealthy and powerful and co-ordinated world society reaching across the solar system, a society that might find out how to keep itself alive and evolving for thousands or millions or billions of years, a time as long as all of evolution past. It is a tremendous prospect.

Hardly anyone has seen the enormous sweep and restructuring and unity and future of it except perhaps dreamers like H. G. Wells or Teilhard de Chardin. It is a quantum jump. It is a new state of matter. The act of saving ourselves, if it succeeds, will make us participants in the most incredible event in evolution. It is the step to Man.

Letters to the Editor

LEFT HAND, RIGHT HAND

Sir,

In your issue of March 1965 on page 19 you state, regarding Leonardo da Vinci: "the inventor took precaution to write his scientific notes so that they could only be deciphered when reflected in a mirror." May I point to the fact that Leonardo's so-called "mirror-writing" was scarcely a "precaution". He wrote everything in this way but simply due to the fact that he was left-handed. And for a left-handed person writing from right to left is much easier than our normal direction.

In the drawing on the same page it is clearly to be seen that the hatching in his sketches is equally in the opposite direction to what a right-handed person would have done: Leonardo hatches from top left to down-right.

H. Friedlaender
Jerusalem, Israel

RACIALISM ISSUE

... Your issue on race and racialism (April 1965) ranks with those on the cost of world armaments, on human rights and on illiteracy, among many others, as an important contribution towards real peace and better international understanding. With this issue the Courier attained even higher standards by drawing attention to an anachronistic and immoral situation that exists in the mid-20th century.

Aureliano Veloso
Porto, Portugal

... One is forced to agree with the economic measures recommended by the General Assembly and the U.N. group of specialists, for what I would call "an economic blockade with humanitarian aims." But should not South Africa also be isolated politically? The African countries, which are directly concerned with and deeply conscious of the problem of freeing their "racial brothers", realized this when they met at the Conference of Heads of State at Addis Ababa in 1963. Other countries, having approved the Universal Declaration of Human Rights, should follow this example, and sever diplomatic relations with the South African Government.

Gilbert Renard
Brussels, Belgium

... Bravo! to the Courier for dealing with a problem as topical as this and for exposing a serious violation of human rights.

D.D. Krivorucho
Lomas de Zamora
Argentina

... I deplore much of the present South African Government's racial policies, but I believe in being truthful, and both the picture and caption on page 29 of the April issue appear to give a totally misleading and false impression. In the first place the picture shows a building remarkably like the Ernest Oppenheimer Hospital in Welkom, 200 miles from Johannesburg. Secondly, I have seen similar groups of Africans as they appear after having just arrived by plane (as many do from the neighbouring northern countries) to work on contract in the gold mines where they receive training and care superior to anything provided in the purely industrial areas of Johannesburg. Furthermore these men both in the mines and in industry do have a choice of work although this is somewhat limited.

The Ernest Oppenheimer Hospital is the largest native industrial hospital in South Africa and was opened in 1952 to serve the native employees of five mines in the Welkom, Orange Free State area. It has 800 beds and is staffed, equipped and operated at a very high standard indeed.

N.V. Baldwin
Ringwood, England

... No one who reasons intelligently can accept the idea of white racial supremacy... all men have the right to live in full independence, free of all tutelage, free to develop the resources of their soil, free, above all, to educate themselves.

F. Brunet
Grenoble, France

UNITED RELIGIONS ORGANIZATION

In a world slowly growing to unity there is not only a want of co-operation of peoples (international solidarity) but also a want of co-operation of religions (interreligious solidarity).

Next to the United Nations where international deliberation on the highest level has been taking place for the past 20 years it seems to me it would be useful to found a United Religions Organization (U.R.O.) consisting of representatives chosen by the great world religions for interreligious deliberation on the highest level.

H. Spitzen
The Hague, Netherlands

DESTRUCTIVE PLAYTHINGS

Sir,

Women in Australia are concerned at the prevalence of war and horror toys for children. Protests by our organization forced a large chain store to withdraw its nation-wide window display of jungle warfare toys. A member of parliament protested to the government about a T.V. advertisement of playthings featuring horror and violence and had this particular advertisement withdrawn. A Committee For Creative Toys has been formed in Sydney to inspect toys and to advise and encourage shops to stock constructive instead of destructive toys.

We have heard that, women in England, United States, France and some Scandanavian countries are also worried by the toys being offered to children. Therefore we feel that the matter of children's toys is now an international one and that toys which condition children's minds to accept war and violence as an inevitable and even desirable part of life are a violation of Principle 10 of the U.N. Declaration of the Rights of the Child.

We would like the Unesco Courier to investigate children's playthings throughout the world and show which will distort a child's mind and which will prepare him to live in friendship with his fellow men. We also think that governments should be known according to the training they give the future citizens of the world.

Freda Brown
National Secretary
Union of Australian Women
Sydney, New South Wales

HUNGER FOR KNOWLEDGE

Sir,

I enclose 180 Viet-Nam piastres for a subscription to the Courier. I'll let you in on a secret—I had to go without breakfast for more than a month to save this small sum. If there should be any money left over, please send me an interesting booklet on science.

Hô Binh-An
Saigon, Republic of Viet-Nam

COURIER IN CURACO

Sir,

It is my intention in co-operation with a few journalist friends, to prepare a booklet, chiefly containing translations in Papiamento, our local language, of articles which appeared in the July-August edition of the Courier on youth. Our idea is to circulate this booklet in our island at this very appropriate time in a large quantity, say 20 to 30 thousand copies for a total population of about 135 000.

Hector G. Suares
Curaçao, Netherlands Antilles

LITTLE-KNOWN PEOPLES

Sir,

We are already well-enough informed about Italian, French, Greek and English cultures, and those of the other "big nations". We learned about them at school and university and now hear about them from the cinema and on radio and television. But what is known about the cultures of the Turkish or Ugro Finnish populations of the Soviet Union: the Tatar, Bashkir, Uzbek, Kazakh, Kirghis, Turkmen, Azerbaijan, Kumyk, Chuvash, Mari, Mordovian and Udmurt peoples, to name only some? Almost nothing, I am sure.

I should like to read more in your magazine about "unknown" peoples such as the Indians of North America, the forgotten peoples of South America, the Kurds and the Berbers, and the Pushtu of Pakistan. I should also like the world to become familiar with my own country and with its culture, past and present.

Nourihan Fattah
Kazan, U.S.S.R.

From the Unesco Newsroom...

STUDENTS ABROAD: Some 290,000 students—2% of the world's student population—were studying abroad in 1964 according to the latest edition of Unesco's publication, "Study Abroad". The U.S.A. had the most foreign students (over 74,000), followed by France (30,000), the Federal Republic of Germany (25,000), the U.S.S.R. (21,000) and the U.K. (14,000 in universities and university colleges alone).

INDIA'S NEW FISHERIES: An Indo-Norwegian project to develop India's south coast fisheries has set up six fishing stations with boat-building yards, ice factories, freezing plants and insulated vans since 1952. The Norwegian Agency for International Development is now compiling the first fishing chart of the west coast of India from data supplied by Indian sources and research vessels of the International Indian Ocean Expedition.

DEATH ON THE ROADS: In the past ten years the annual road accident death rate has more than doubled in many countries. In 1962 U.S. traffic accidents killed 40,000 people—twice as many as died from infectious diseases. Ways and means to halt this rising toll were recently reviewed and assessed by traffic experts from 23 countries at a special seminar convened in Alexandria by WHO.

WATER UNDER DESERTS: All of Saudi Arabia, an area as large as western Europe, is short of water, yet under its deserts lie reservoirs of water which will meet the country's needs for many years, report water development experts of FAO. These vast underground reserves, as well as general land and water reserves are now being investigated under an agreement between Saudi Arabia and FAO.

PEOPLE'S UNIVERSITIES: Some two million persons now attend 10,000 adult evening courses in Soviet "People's Universities". This represents a fifty per cent increase in the number of evening schools opened in the past three years. Students come from every walk of life and are of all ages.

ALPHABETS FOR 700 LANGUAGES: The Institute of Linguistics, a U.S.-based international association of linguists, plans to produce an alphabet and basic literature for all the estimated 700 or more unwritten languages used by the peoples of New Guinea. Two-person teams from the institute do repeated six-month periods of duty with tribal groups, learning their languages and customs and working out systems of writing for them.

TRAINING THE SEISMOLOGIST: Twenty-two trainees from 12 countries have begun their courses at the International Institute of Seismology and Earthquake Engineering in Tokyo, operated by Japan's Ministry of Construction and Unesco, with funds from the Government of Japan and the U.N. Special Fund. The Institute gives advanced training in seismology and earthquake engineering to scientists and engineers from countries in seismic areas where earthquake measuring and reporting are not yet fully developed.

RESEARCH FOR PEACE: A proposal to put scientific methods of amassing and evaluating information to work in one of the few domains where they have not yet been applied—international relations and the preservation of peace—is made in a recent issue (Vol. XVII, Nº 3, 1965) of the Unesco quarterly, "International Social Science Journal". In this issue, devoted to peace research, Professor Kenneth Boulding, Research Director of the Centre for Research on Conflict Resolution, at the University of Michigan (U.S.A.), proposes a world-wide system of social-data collecting stations which would transmit information to be centrally processed in much the same way that information collected at meteorological stations is processed into weather maps and predictions.

WEATHER WATCH FROM SPACE: Late this year or early in 1966 the American "Tiros" satellite system will start to provide cloud cover pictures of every spot on earth at least once a day, reports the World Meteoroligical Organization. The satellite will orbit the earth every 113 minutes at an altitude of 750 miles. Data will be received and analyzed by the World Meteorological Centres, of which three have now been designated—Moscow, Washington and Melbourne—as part of the World Weather Watch.

MOBILIZING FOR LITERACY: In Mexico, 11,000 literacy centres have now been established by the federal government while state and municipal governments support a further 2,870, and private enterprise 2,200. Teachers and students from training colleges are being enrolled as instructors, and over 34 million free textbooks have been distributed in the past nine months alone.

A NEW NOAH'S ARK: Over 1,000 animals, including the world's two largest—the 100-ft., 160-ton blue whale and the smaller fin whale—are in danger of becoming extinct according to the World Wildlife Fund. In a recent report (x) on its world campaign for nature conservation between 1962 and the end of 1964, the Fund says that national appeals raised £675,000 ($1,900,000) for this work.

(x) "The Launching of a New Noah's Ark", Collins, London, 13/6, obtainable from 2 Caxton St., Westminster, London.

SCIENCE FORUM FOR YOUTH: Young people from 27 countries had lively discussions on topics such as "nuclear energy—do the gains outweigh the risks?", at the Seventh International Youth Science Fortnight held recently in London. Lectures, seminars and scientific and cultural visits were also features of this event—now a popular annual rendezvous for scientifically-minded younsters from many nations.

A CORRECTION: In our March 1965 issue we quoted a series of statements made by delegates to the Unesco General Conference in 1964. In the item on Cuba we stated that the number of classrooms in Cuba had increased by 5,000 since 1958. This figure was erroneous and should have read 20,000. At the General Conference on October 23, 1964, Dr Armando Hart, Minister of Education of Cuba, had in effect said: "Before the Cuban revclution there were 700,000 pupils registered in primary schools; this figure has now risen to 1,280,000 pupils. Before the Revolution there were about 15,000 primary school classrooms in existence; five years later, in the school year 1963-64, this number had increased by 20,000." Cuba's National Literacy Campaign began in 1961.

POPULATION PROBLEMS AND DEVELOPMENT

The latest U.N. commemorative stamp focuses attention on the importance of the world's population growth and the urgent problems it raises for economic and social development. Population problems were recently examined in a world-wide perspective by a conference under U.N. auspices held in Belgrade Yugoslavia. The new U.N. stamp is issued in 4, 5 and 11 cent denominations. As agent in France of the U.N. Postal Administration, Unesco's Philatelic Service stocks all U.N. stamps and first day covers currently on sale. For further details write to The Unesco Philatelic Service, Place de Fontenoy, Paris (7).

Flashes...

■ *Polio is on the way out in every country where mass vaccination has been applied over the last ten years, reports WHO. In 1964 the U.S.A. had only 121 cases compared with 38,476 in 1954.*

■ *Singapore became Unesco's 120th member state on October 28.*

■ *The British Government is to grant the National Institute of Adult Education up to £11,000 to finance an investigation into the standard of adult education in Britain.*

■ *Unesco is to launch a six-year pilot project in teaching by television on the university level in Poland, in co-operation with the government.*

■ *An "alarming increase" in deaths from lung cancer in Europe and North America is reported by WHO. In the ten years ending 1962 death rates more than doubled in many European countries and rose by 60 % in the U.S.A.*

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UNESCO COURIER INDEX 1965

January

MONUMENTS IN PERIL. Campaign to protect our cultural heritage — Science of conservation (H. Plenderleith) — Venice, a sinking city (P. Gazzola) — Care of old paintings — Aphrodite's city resuscitated (colour pages) — Map of Unesco conservation — Stones also die (R. Sneyers) — Angkor, before, after — Menace of the bulldozers (J. Brew) — Message to young people (R. Maheu).

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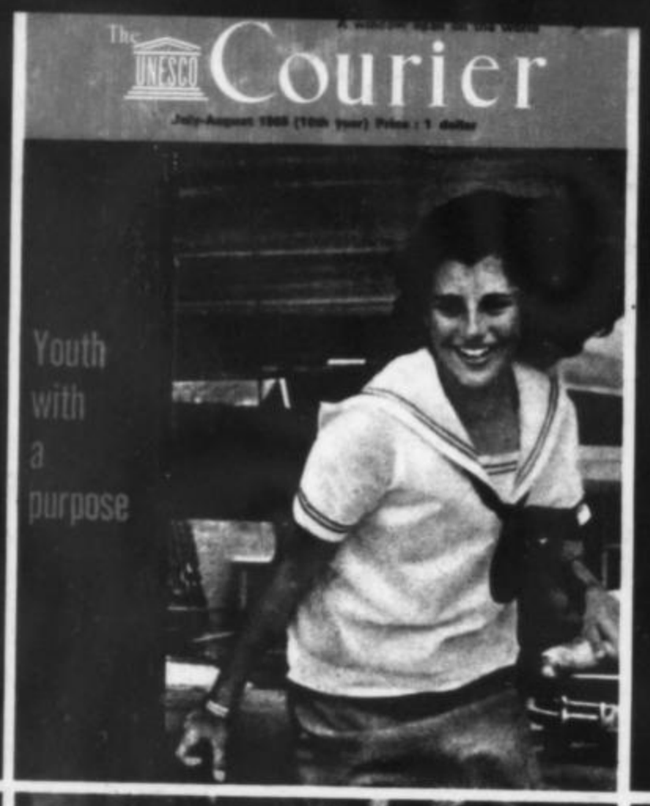

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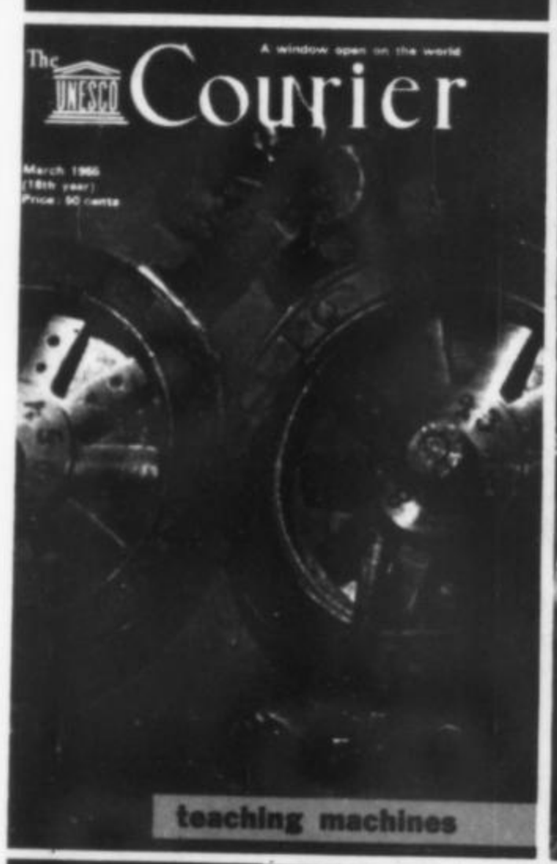

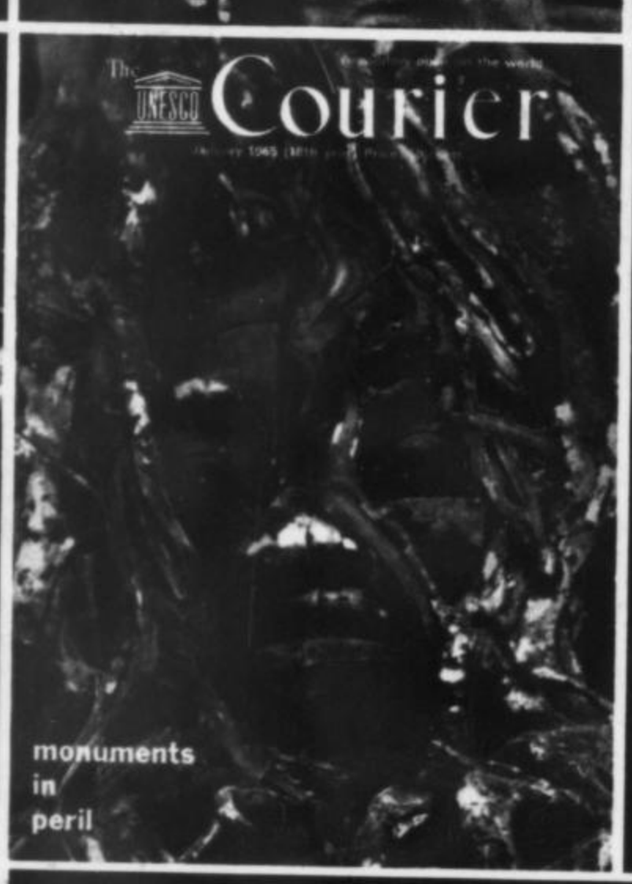

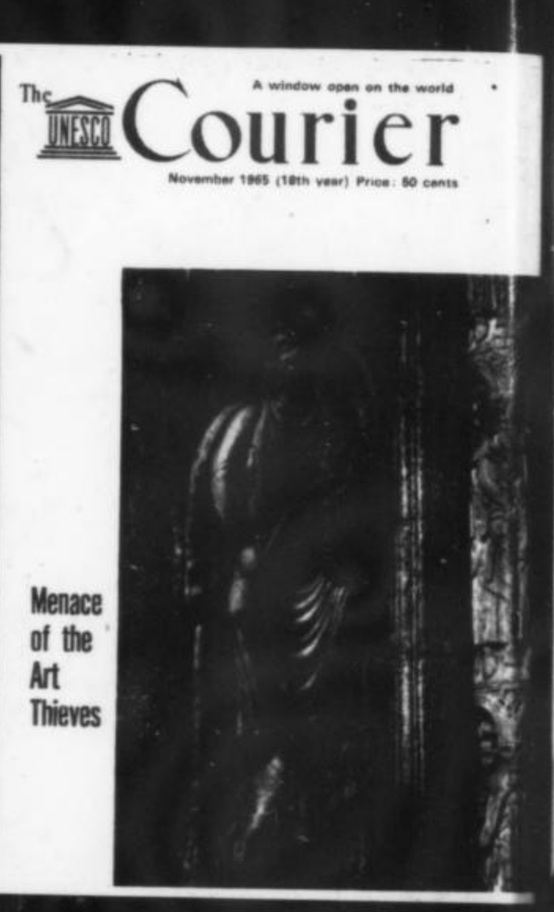

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